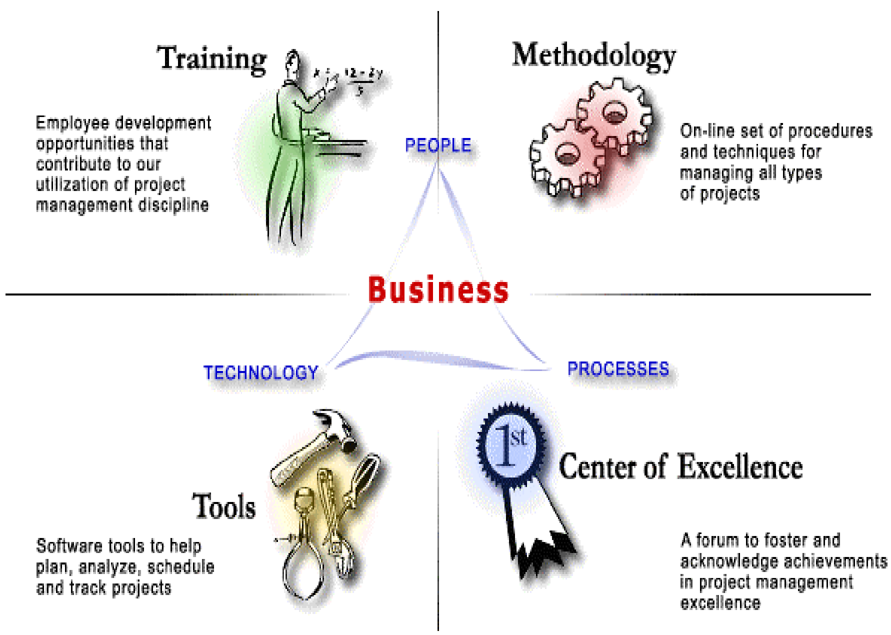
STATE OF MICHIGAN

PROJECT MANAGEMENT METHODOLOGY



OFFICE OF PROJECT MANAGEMENT

www.state.mi.us/cio/opm

MAY 2001

Project Management Methodology

Purpose
This methodology was created to assist the State of Michigan's government agencies to manage and monitor their Information Technology projects by establishing formal project management practices. The methodology is generic enough to be applied to all projects within the state. It is transferable from project to project but is not intended to be the sole source of information on Project Management.

Why This Methodology Should Be Used
Project Management is a process that, like anything else, improves with practice and repetition. This guide is a basis for a standard suite of processes and associated documents that will facilitate the implementation and control of project management phases at all levels of state government.

Update Process and Cycle of this Guide
This edition of the Project Management Methodology (May 2001) is its second release. This methodology is updated on a regular basis as requested by the State's Project Management Methodology Advisory Group (made up of agency representatives). The Methodology Advisory Group meets on a quarterly basis to discuss content changes.

Changes and improvements to this methodology will be a product of input from the user. If changes or additions need to be made, please contact your agency representative to the Methodology Advisory Group, or contact the DMB Office of Project Management, and discuss it with him or her. The representative will have the opportunity to take the idea to the next Methodology Advisory Group meeting and recommend the addition or change in the next version release.

Changes in this Second (May 2001) Release of the PMM
This second release of the State of Michigan Project Management Methodology came about from experiences and lessons learned in using the PMM since the initial release in May 2000. Changes include:

- Added the Project Transition Process (Overview)
- Enhanced Project Charter sub-section (Initiation)
- Enhanced Work Breakdown Structure sub-section (Planning)
- Enhanced Risk Planning sub-section (Planning)
- Updated all PMM Templates for consistency, and the elimination of the Executive Status Report and the addition of the Project Transition Template, and
- Updates to several diagrams and minor wording changes

Audience
The Project Management Methodology is intended for top-level managers, experienced and non-experienced project managers, project mentors and coaches, project management instructors, project team members, technology-oriented project participants, project management offices, and any interested individual desiring to gain an overview insight into conducting project

management activities and recording the necessary documentation for the project. This methodology document is considered an in-depth guide that describes how to initiate project documentation by stepping through the phases of a project and providing the necessary outlay of documents needed to support a particular project phase.

This Project Management Methodology Desk Reference, a high-level version of this document, can be of significant benefit to improve one-on-one project management training conducted by a project mentor or coach. The Desk Reference can also be used as a reference for developing train-the-mentor experiences for the classroom.

Points of Contact

Please forward any comments or questions to the Office of Project Management within the Department of Management and Budget. The Office of Project Management can be reached at (517)-241-2960, or visit their web site at http://www.state.mi.us/cio/opm.

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PROJECT MANAGEMENT METHODOLOGY

SECTION 1 – OVERVIEW

Section 1: Project Management Overview

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Introduction

Project Management Methodology

Prior to discussing the various phases and methodologies involved in project management, it helps to understand what project management is and the roles of the people involved. The following subsections set the groundwork for understanding the methodology.

Project Definition

The Project Definition subsection provides a definition for the term "project." The definition is important in order to understand how and when the methodology should be applied.

Project Management Roles and Responsibilities

The Project Management Roles and Responsibilities subsection provides the groundwork for identifying the basic roles and responsibilities of those parties who will contribute to the success of a project.

Project Management Organizational Structure

Project management organizational structure has a lot to do with the effectiveness of a project and its staff. The three most well-known organizational structures are the functional, projectized, and matrix hierarchies.

Active Project Transition Process

The Active Project Transition Process was added in the May 2001 release of the State's Project Management Methodology (PMM). Originally introduced by the Michigan State Police's Project Office, this template was designed to help projects that are already into the Planning or Execution phase, to begin using the State's Project Management Methodology's formal processes and templates.

Information Technology Components for Project Overview

The last subsection in this section, and in all the project phase sections, will provide guides to assist the reader in deciding on what project management concepts must be applied during development of technology-oriented products. It is not the intent of these sections to specify details for undertaking Systems Development Life Cycle types of projects, and it is certainly not intended to supercede any procedures already in place within the agencies.

Project Management Methodology

Project Management Methodology

This subsection provides the overview, description, and purpose of a State of Michigan methodology for project management.

According to the Project Management Institute's (PMI®) Project Management Body of Knowledge (PMBOK®), "Project Management is the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder expectations from a project."

The objective of this State of Michigan PMM is to provide standard methods and guidelines to ensure that projects are conducted in a disciplined, well-managed, and consistent manner that promotes the delivery of quality products that meet the customer's needs and results in projects that are completed on time and within budget. The concept of this methodology, and how it fits in the overall project life cycle methodology, is shown in Figure 1.1.

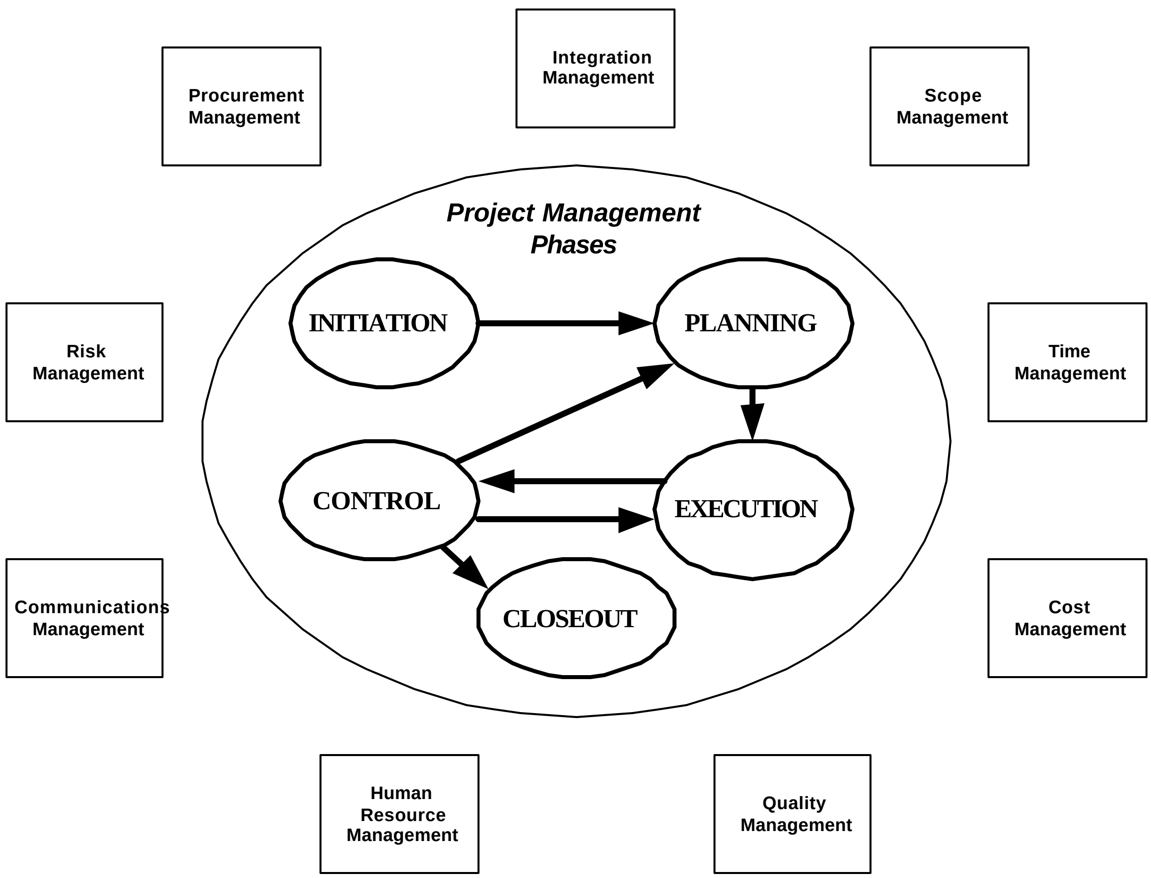

Figure 1.1
State of Michigan Project Management Knowledge Areas and Phases

Project Management Methodology

Charactyersitics of the Project Life Cycle

All projects are unique. As such, each project takes on a different form and presents many degrees of uncertainty. Therefore, managing these projects requires that organizations usually divide these projects into more manageable pieces called phases. These phases allow the project team to provide better management and control in order to provide efficient and productive efforts throughout the life of the project. Collectively these phases are sometimes called the project life cycle.

Although these project phases have been established to complement the project teams' involvement with the tasks, these phases are not stand alone as may be indicated in the 'phases' portion depicted in figure 1.1. These phases overlap and can typically resemble something as portrayed in figure 1.2.

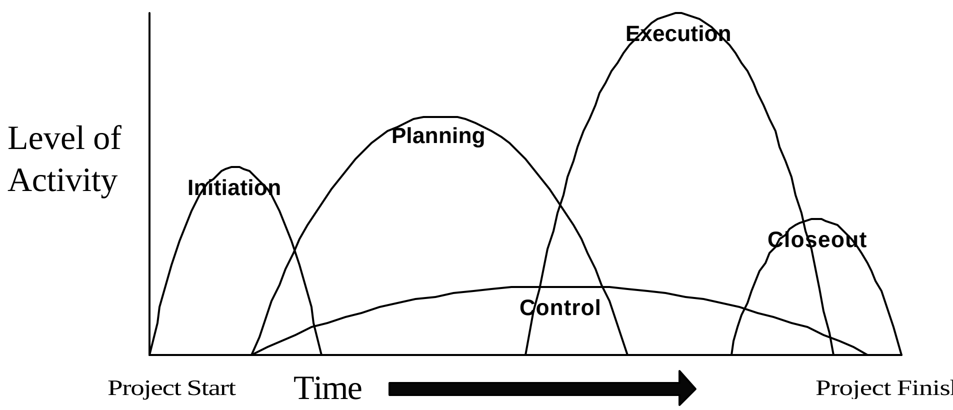

Figure 1.2
Life Cycle Project Phase Overlap

Project Management is an Iterative Process

Project management is an iterative process. For example, the planning phase is, in part, a refinement of the initiation phase. In some instances, phases may be repeated because of changes within the project. Also, project phases may be performed simultaneously as well as sequentially. For instance, the planning, execution, and control phases may be performed in parallel as changes are made to the project baseline. This interaction is shown in Figure 1.1 by the continuous feedback loop from planning to execution to control and back through planning.

Other activities, such as oversight, quality control, and executive review, which are described later, are ongoing and affect each and every phase of the project.

This methodology represents the coordinating mechanism for the State of Michigan and its agencies. The methodology addresses the *management* of the project as well as the specific phase of a project development effort.

Applicability of the Methodology

The project management methodology has a general applicability to the management of projects in the State of Michigan. The degree to which State agencies should apply the methodology is based on project

Project Management Methodology

management policies defined in the State's policies, the policy guidelines of the agencies involved, the magnitude of the project, and the project risks. This methodology identifies responsibilities and activities that are assigned and performed on projects.

Tailoring of the Methodology

The methodology design is adaptable to meet the unique requirements of the wide variety of non- IT and IT projects the State of Michigan desires to conduct. (See the Information Technology Components subsection to this section.)

The flexibility of the methodology and associated processes acknowledges that large, complex projects require a more rigorous application of management processes than small, well-defined projects with readily achievable goals.

The project manager assesses the project characteristics and determines how to tailor the methodology and what project management processes are required. That tailoring is then reflected in the Project Plan and associated documentation.

PMM Implementation Procedures

The methodology is the foundation for building and identifying the types of procedures needed. Depending on the basic processes that a State agency currently has in place to support project management, some changes may be required to successfully implement the methodology. Most of the materials contained herein, however, are guidelines, and State agencies are encouraged to tailor and add to the processes to best suit their business environment.

Continual Process Improvements

This methodology must not become stagnant or obsolete. Processes will be established to improve the methodology over time. Process improvement is cyclical and requires mechanisms to continually evaluate and refine improvements until a process is fully optimized for an organization.

The State of Michigan and its agencies are responsible for continually adapting and readapting the methodology and associated policies, using support from project management steering committees and advisory boards, for both input and evaluation. The agencies are also responsible for ensuring that project management policies are implemented. The state agencies and their project staffs have the following responsibilities:

- To provide continual input for improvement of the policies and the methodology.
- To identify areas that require modification and adaptation.
- To ensure that project management policies are implemented within their organizations.

Project Management Methodology

Business Process Review

As systems-oriented organizations direct more and more efforts and resources toward introducing suggested technology improvements (e.g., client-server, intranet, extranet, data warehousing, and other applications), it cannot be assumed that the business processes in place are compatible with the projects being introduced. A review of current business processes is needed to ensure compatibility between suggested technology improvements and the current way of doing business.

Like any system over time, business processes can result in an outdated business environment. Consequently, more work may be handled informally outside of the established business processes. As a result, any current or planned replacement technology linked to the outdated business processes may also be handled outside of established business processes.

Investigating the state of the business processes before initial work toward the integration of new technology is of paramount importance. It would be wise to include an analysis of the business processes as part of the Project Concept Document (see Section 2: Project Initiation Phase) and also as part of the Critical Success Factors (see Section 3: Project Planning Phase) in order to design for a successful project completion.

In summary, the business processes should be driving the technology, not the technology driving, or greatly influencing, the business processes.

Project Definition

Project Definition

Defining what a project is helps in understanding the project management methodology and its effectiveness for project management. Organizations have differing views on project definition. Throughout this methodology, a *project* will be defined as follows:

> *A project is a temporary endeavor undertaken to create a unique product, service, or result..*
> *PMBOK®, 2000*

The project management techniques defined in this methodology require that a project exist. Typically, a project is initiated by a person or organization that recognizes a business need or a specific problem needing resolution. When the business need or problem is defined, an initial concept is developed around potential solutions. A true project is not just a set of tasks to be performed. By viewing the project in terms of a process that will achieve a desired end goal, the project manager breaks down the effort into a series of tasks. The completion of the tasks leads to the final solution (the product) of the project.

Temporary Process

A project includes a set of temporary processes because once the end goal is achieved and the product is delivered, the project is completed. For this reason, the end point of a project or objective needs to be defined at the very beginning of the project to ensure successful completion. The reason some projects never end is because no one ever defines what constitutes *complete*!

The basic question for defining success criteria is, “Why are we doing this project?” Criteria for project success are quantifiable, measurable, and expressed in terms of business value metrics. They include having a customer; a project with a purpose or objective, a scope, deliverables, start and end dates; a sponsor; a project manager; and identified resources.

Well-defined Goals

Projects require well-defined goals to determine completion. Without well-defined goals and objectives, a project lacks purpose.

The problem definition needs to be carefully crafted and well thought out. This will determine the project objective, focus, and approaches for resolution. The focus is generated in terms of milestones, deliverables, and requirements. Without a clearly defined focus and a stated objective, the project may stray off course (not solving the problem for which it was intended), or it may incur cost and time overruns and ultimately is unsuccessful.

Project Constraints

All projects have constraints, and these need to be defined from the outset. Projects have resource limits in terms of people, money, time, and equipment. While these may be adjusted up or down, they are considered fixed resources by the project manager. These constraints form the basis for managing the project and are discussed later in the methodology.

Project Definition

Project Assumptions

Similarly, certain criteria relevant to a project are assumed to be essential. For instance, it is assumed that an agency will have the foresight to make the necessary budget appropriations to fund internal projects. Project assumptions need to be defined before any project activities take place so that time is not indiscreetly utilized on conceptualizing and initiating a project that has no basis for funding.

Project Management Definition

Defining projects allows State agencies to categorize and execute projects. All of the processes associated with defining, planning, executing, controlling, and closing out the project are considered part of project management.

> *What is Project Management?*
> *Project Management is the application of knowledge, skills, tools, and techniques to project activities to meet The project requirements.*
> *PMBOK®, 2000*

Infrastructure Requirements

Successful project management requires that certain infrastructure elements be in place. Among these are basic skills in people management, established processes for organizational planning and communication, availability of tools that support management processes, and a culture that values cooperation, teamwork, and planning.

Project management requires general management knowledge. The principles, practices, concepts, techniques, tools, and skills of general management are the foundation for project management. Within the general skills are the abilities to work well with people, to take responsibility, to lead a group, and to make decisions.

This methodology provides guidelines for many of the principles, tools, and techniques for project managers.

Project Management Roles and Responsibilities

Explanation of Roles and Responsibilities

A successful project requires that the project team participate (at some level) in the planning process, buy in to the project plan, and be responsible for completion of assignments.

It is important to have a defined formal structure for the project and for the project staff. This provides each individual with a clear understanding of the authority given and responsibility necessary for the successful accomplishment of project activities. Project team members need to be accountable for the effective performance of their assignments.

Project Organizational Structures come in many forms. They are discussed at the end of this section. However, their impact can be seen throughout the project. For example:

- On a large project, individual role assignments may require full-time attention to the function.
- On smaller projects, role assignments may be performed part-time, with staff sharing in the execution of multiple functions.
- Tasking and individual responsibilities are often covered in the Organizational Breakdown Structure (OBS), which is covered in other sections within the methodology.

The Project Team and Stakeholders

Note: It is difficult to manage the expectations of stakeholders because often they have conflicting goals and expectations.

The project team includes a diverse mix of people and skills. It goes beyond just the project member performing specific tasks. The required mix for any project team will include, but not be limited to, the following people:

- People specifically charged with execution of the project solution. Regardless of how a project is organized, there are roles and responsibilities that should be considered for every project. These could include the following:
  - Requirements development staff
  - Business rule specifications staff
  - Project management staff
  - Subject matter experts (SMEs)
  - Documentation (user and technical) staff
  - Training staff
  - Technical staff
  - Leaders/decision makers
- Customers (both internal and external) of the product or service created.
- Project sponsor.
- Stakeholders.

Stakeholders are individuals and organizations that have a vested interest in the success of the project. The identification and input of stakeholders help to define, clarify, drive, change, and contribute to the scope and, ultimately, the success of the project.

To ensure project success, the project management team needs to identify

Project Management Roles and Responsibilities

stakeholders early in the project, determine their needs and expectations, and manage and influence those expectations over the course of the project.

Stakeholders on every project include the following people and groups:

- The project manager, who has ultimate responsibility for ensuring project success.
- The project sponsor, who takes the lead in getting the need for the project recognized as well as possibly providing financial resources.
- The State agency management, who define the business needs of the project.
- The project team members, who are responsible for performing the work on the project.
- The configuration management entities within the boundaries of the project.
- The quality assurance teams who verify the ability of the product or process to meet the stated necessary requirements.
- The agency/state procurement personnel who assist in procuring project resources assigned to State government.
- The customer, who is the person(s) or organization(s) using the product of the project.
- The State of Michigan's citizens and visitors, who are interested in the success of all projects.

The following pages describe, in some detail, the responsibilities of the stakeholders across the various phases of a project. These lists are not an exhaustive enumeration of the activities of the responsible parties. The project management phase activities are discussed at length in other sections of the State of Michigan Project Management Methodology.

Project Management Roles and Responsibilities

Project Manager

The project manager has total responsibility for the overall project and its successful completion. To succeed in this responsibility, the project manager must work closely with the sponsor to ensure that adequate resources are applied. The project manager also has responsibility for planning and ensuring that the project is successfully completed on time, within budget, and at an acceptable level of quality. The project manager must be assigned during the Project Initiation Phase so the plan will be owned by the person responsible for its execution.

Project Manager Roles and Responsibilities

GENERAL FUNCTIONS

- Implement project policies and procedures.
- Acquire resources required to perform work.
- Maintain staff technical proficiency and productivity, and provide training where required.
- Establish and maintain quality in the project.
- Identify and procure tools to be used on the project.

PROJECT INITIATION

- Develop draft Project Concept Document and Project Charter.
- Define project success criteria.
- Document project constraints.
- Document project assumptions.
- Conduct cost-benefit analyses.

PROJECT PLANNING

- Develop detailed Project Plan with the assistance of the project team, tailoring methodology to reflect project needs.
- Create a Work Breakdown Structure and an Organizational Breakdown Structure with the assistance of the project team.
- Develop, or assist in the development of, a Scope Statement, Project Schedule, Communications Plan, Risk Management Plan (which includes a Contingency Plan), Cost Benefit Analysis, Procurement Plan, Configuration Management Plan, Project Budget Estimate, and a Project Transition Checklist.
- Ensure that management, users, affected State agencies, and contractors agree to project commitments.
- Ensure that the Project Plan is approved and baselined.
- Assign resources to project and assign work packages (Resource Plan).
- Approve Project Quality and Configuration Management Plans.

PROJECT EXECUTION

- Manage day-to-day tasks and provide direction to team members performing work on the project.
- Regularly review project status, comparing budgeted to actual values.
- Regularly review project networks, comparing baseline schedules to actual work completed.
- Ensure that Project Plan is updated and signed off as needed.

Project Management Roles and Responsibilities

PROJECT CONTROL

- Make changes to budgets and schedules and make recommendations as needed.
- Review the results of quality assurance reviews.
- Participate in change control board to approve product/project changes.
- Review project risks and establish mitigation procedures.

PROJECT CLOSEOUT

- Develop an action plan for any product that does not pass acceptance test.
- Obtain customer and management approval of completed product.
- Close out open action items.
- Develop post-implementation report.
- Conduct lessons-learned session.
- Close out any financial accounts or charge codes.
- Archive all project data.
- Assist as needed with any post-project delivery audits.
- Assist purchasing contract administrator(s) in contract closeout.
- Celebrate success with stakeholders and the project team.

Note:

Project Manager Skill Sets: Assigning a skilled project manager is of paramount importance to project success. Project requirements necessitate that the qualifications of the project manager be commensurate with the complexity of the project. Accordingly, the following skill sets are thought to play a major role in the assigning of a project manager (Archibald 1992).

- Integrative Skills—Holistic philosophy, systems approach thinking, flexibility, and cultural awareness.
- Project Management Skills—Planning, organizing, controlling, and monitoring.
- People Skills—Leadership, communication, facilitation, motivation, and team building.
- Technical Skills—Engineering and scientific ability, mathematical competence, specialized expertise.
- Business and Management Skills—Organizational operations insight, general business management, and fundamentals of planning, budgeting, and finance.

A more detailed discussion of selecting a project manager with appropriate qualifications is provided in the Project Initiation Phase section of this methodology.

Project Management Roles and Responsibilities

Project Sponsor

The project sponsor is usually a member of the agency's management team, which will ultimately be the recipient of the project's end result. A good project sponsor is a prerequisite for a great project manager. The sponsor is usually head of a program area and not normally a day-to-day staff person. This is the person who makes the business argument for the project to exist. This individual usually controls the overall funding of the project.

The project sponsor may or may not be part of the agency management.

Sponsor Roles and Responsibilities

GENERAL FUNCTIONS

- Articulate program or State agency requirements.
- Ensure that requirements are met.
- Provide necessary funding and resources as appropriate.
- Champion the project to provide exposure and buy-in from State government and officials.
- Communicate the sponsor's views on project progress and success factors to the project team and other stakeholders.

PROJECT INITIATION

- Provide strategic plans and guidance to correctly identify the relevance and value of the project both today and in the future.
- Define sponsor needs.
- Obtain funding for project when necessary.
- Assign sponsorship personnel as points of contact.

PROJECT PLANNING

- Review and approve Project Plan.
- Participate in planning sessions.

PROJECT EXECUTION

- Attend executive requirement reviews.
- Help resolve requirements problems.
- Provide written agreement to requirements and qualifying criteria.

PROJECT CONTROL

- Attend and participate as needed at Project Status Reviews and steering meetings.

PROJECT CLOSEOUT

- Provide representatives to attend lessons-learned meeting.
- Sign off on project completion.

Project Management Roles and Responsibilities

State Agency Management

State agency management identifies the agency's need for projects, assesses project risk, and approves project commitments. It is also responsible for establishing the agency's strategic plans and for ensuring that projects are consistent with agency and overall State IT plans, if the project is IT Based. It is also responsible for developing the procedures to ensure that policies are followed.

State Agency Management Roles and Responsibilities

GENERAL FUNCTIONS

- Prioritize State agency business needs and include in State agency strategic plan.
- Ensure that sufficient resources are available to conduct projects.
- Review/approve commitments to external entities (e.g., vendors, other agencies).
- Ensure that State agency staff is properly trained.
- Evaluate and recommend adoption of automated tools.

PROJECT INITIATION

- Select project manager and assist in staffing effort.
- Review/validate Risk Analysis.
- Ensure that funding is available.

PROJECT PLANNING

- Review/approve project plan and budget and establish management reserves.
- Ensure that team leaders assist in estimation.
- Ensure project staff availability.

PROJECT EXECUTION

- Regularly conduct executive management reviews.
- Approve changes to the Project Plan.
- Review risk mitigation plans.
- Review/approve changes in contract commitments.

PROJECT CLOSEOUT

- Contribute to lessons-learned sessions.
- Ensure customer and sponsor acceptance.
- Ensure closing of accounting/financial files.

Project Management Roles and Responsibilities

Project Team

The project team has responsibility for conducting project activities. Project team members, as necessary, assist the project manager in planning the development effort and help construct commitments to complete the project within established schedule and budget constraints. The project team may include the subject matter experts responsible for implementing the project solution. Customers and/or stakeholders should interact with the project team to ensure that requirements are properly understood and implemented.

Project Team Roles and Responsibilities

GENERAL FUNCTIONS

- Identify technical solution alternatives.
- Implement solution within budgeted cost and schedule.
- Coordinate with quality assurance organization.
- Support project planning and tracking.

PROJECT INITIATION

- Provide estimates for developing products.
- Ensure that requirements are feasible and appropriate for available resources.
- Analyze requirements for completeness, consistency, and clarity.
- Conduct feasibility studies.

PROJECT PLANNING

- Develop technical approach.
- Partition and assign development tasks.
- Assist in development of estimates and schedules.
- Assist in development of a quality assurance and configuration management plan.
- Identify tools needed for the project.
- Ensure that all members of the project team understand the Project Plan.
- Identify staff training needs.
- Ensure that project execution staff fully understands requirements.

PROJECT EXECUTION

- Create product and process solutions.
- Track the project execution effort and submit status reports.
- Conduct internal and external reviews and walk-throughs.
- Create configuration control and baseline documents.
- Create testing plan and coordinate test activities.
- Execute assigned project tasks.

PROJECT CONTROL

- Identify problems and schedule fixes.
- Coordinate with quality assurance, review quality assurance results, and correct any deviations.
- Identify and react to risks as they are found.
- Participate in change reviews.

Project Management Roles and Responsibilities

PROJECT CLOSEOUT

- Participate in lessons-learned sessions.
- Identify ways to improve project processes.
- Turn over all project-related documentation to the project manager for archiving.

Project Management Roles and Responsibilities

Configuration Management

The configuration management (CM) function, usually performed on medium to large size projects, is responsible for planning, coordinating, and implementing project configuration management activities. Specifically, this is a disciplined procedure that is established for controlling and documenting the functional and physical characteristics of the products being designed or produced. The Configuration Management subsection, within the Project Control Phase section of the methodology, explains this in greater detail.

Configuration Management (CM) Roles and Responsibilities

GENERAL FUNCTIONS

- Identify CM needs on projects.
- Be a proponent for change management.
- Recognize and document requirements as they apply to the project.

PROJECT INITIATION

- Provide CM approach based on requirements and State agency standards.

PROJECT PLANNING

- Develop draft project CM plan.
- Identify items to be placed under CM control.
- Identify CM tools that support project needs.
- Baseline the approved Project Plan and relevant specifications.
- Create and supervise the project baseline library.

PROJECT CONTROL

- Lead project Change Control Board and distribute change information.
- Manage access to the project library.
- Control and distribute products.
- Perform CM Audits.
- Record CM actions and maintain action item list.
- Track problem reports.

PROJECT CLOSEOUT

- Participate in lessons-learned session.
- Identify strengths and weaknesses of CM approach.
- Archive project library.

Project Management Roles and Responsibilities

Quality Assurance

The quality assurance (QA) function incorporates a process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards. Ideally, quality assurance is a part of each team function, with team members responsible for quality as a key component of each job assignment. Quality assurance is discussed in greater detail in the Project Planning Phase section of this methodology.

Quality Assurance Roles and Responsibilities

GENERAL FUNCTIONS

- Review and verify that the State agency has management and technical QA processes that are followed.
- Maintain project library and repository of project metrics.

PROJECT INITIATION

- Ensure that requirements are identified.

PROJECT PLANNING

- Verify that plans are reviewed by all affected groups.
- Review process used for estimating and planning.
- Prepare a project QA plan that identifies quality activities and resource requirements.
- Assist in developing QA estimates.
- Verify that requirements are clear, verifiable, and testable.
- Ensure that risks are properly identified and tracked.
- Provide orientation to project staff and managers on the role of quality assurance.
- Coordinate the assignment of external Independent Verification &Validation auditing contractors, if necessary.

PROJECT EXECUTION

- Collect and analyze project metric data.
- Maintain noncompliance issues list under CM control.
- Observe testing and inspect test reports as needed.
- Verify deliverables for conformance to standards.

PROJECT CONTROL

- Coordinate formal reviews and audits and participate in informal reviews.
- Verify that State agency and project policies are followed.

PROJECT CLOSEOUT

- Archive project metric data.
- Certify readiness of products.
- Assess project quality process.
- Participate in lessons-learned session.

Project Management Roles and Responsibilities

Customer

Customers are responsible for ensuring that their needs are expressed and for verifying that a completed project meets those expressed needs. These are also the people who may need to be trained in the new process or product created as a result of the project.

Customer Roles and Responsibilities

GENERAL FUNCTIONS

- Articulate customer requirements.
- Ensure that requirements are met.
- Ensure that staff are trained and "ready to accept" the new product.
- Be proponents of the new product to other business area staff.

PROJECT INTITIATION

- Clearly define customer needs and requirements to the project manager and project team.

PROJECT PLANNING

- Review and approve Project Plan.
- Review project status reports.
- Assign customer personnel as project points of contact.
- Provide written agreement on requirements and qualifying criteria.
- Identify personnel who will need to be trained.

PROJECT EXECUTION

- Attend training sessions.
- Assist in product testing, if needed.
- Approve delivery and installation procedures.
- Review current business practice and the impact the new product will have on it.
- Develop procedures, policies, and systems to support the new product.

PROJECT CONTROL

- Attend requirements reviews.
- Review designs as needed.
- Assist in resolving requirements problems.

PROJECT CLOSEOUT

- Provide representatives to attend lessons-learned meeting.

Project Management Roles and Responsibilities

State of Michigan

The State of Michigan (more specifically, the Office of Project Management and the Office of Information Technology Solutions within the Department of Management and Budget) is responsible for defining statewide project policies and for ensuring that these policies are followed by all State agencies. The State is also responsible for reviewing and approving the feasibility of project plans and for providing oversight on high-risk or high-cost projects.

The State review function includes reviewing project plans, contracts, and other project commitments to assess risk and, when necessary, to recommend corrective action for a troubled project. The State performs these general functions in addition to the specific functions summarized below.

State of Michigan Roles and Responsibilities

GENERAL FUNCTIONS

- Define, review, and update Michigan's Project Management Methodology and policies.
- Provide leadership and resources to improve project management.
- Review/approve State agencies' waivers and deviations from policies.

PROJECT INITIATION (APPLICABLE FOR HIGH-RISK OR HIGH-COST PROJECTS)

- Review project concept for large-scale projects.

PROJECT PLANNING (APPLICABLE FOR HIGH-RISK OR HIGH-COST PROJECTS)

- Review and help identify project risks.
- Verify that project goals are defined.
- Assign QA oversight as indicated by the State risk analysis and review of the project plan and initiation documents.
- Approve Project Plan.
- Ensure that the Project Plan is signed-off and baselined.

PROJECT EXECUTION (APPLICABLE FOR HIGH-RISK OR HIGH-COST PROJECTS)

- Ensure project oversight is performed.
- Review project status.

PROJECT CONTROL (APPLICABLE FOR HIGH-RISK OR HIGH-COST PROJECTS)

- Review project status.
- Advise on resolution of serious project problems.
- Suspend or terminate poor-performing projects.

PROJECT CLOSEOUT (UPON REQUEST)

- Collect and archive project database.
- Review and archive post-implementation evaluation report.
- Participate in lessons-learned meetings.

Project Management Organizational Structure

Project Management Organizational Structure

Project management organizational structure has a lot to do with the effectiveness of a project and its staff. The three most well-known organizational structures are the functional, projectized, and matrix hierarchies.

The functional organization is a hierarchy in which project staff members are grouped by specialty (e.g., marketing, accounting, etc.), have a clear line of authority, and have one superior within their functional organization. In this organization, the line of authority normally goes from the project manager, through a functional manager, to the project staff member, and back. Therefore, the project manager's authority over the project staff is limited.

The projectized organization typically includes collocated team members with different skill sets who stay together as cohesive units for extended periods of time and over several project engagements. Project manager authority is greatest in the projectized organization.

Matrix organizations are a combination of functional and projectized hierarchies. Matrices use a system in which project staff members are "borrowed" from their functional organizations to work on a specific project and then returned once their part of the project has been completed or their skill sets are no longer needed. There are three different types of matrix organizations:

- <u>Weak Matrix</u>: Similar to functional hierarchies in which a project manager borrows an employee from a certain functional discipline to do work on a project, but the project manager's responsibilities are to do more coordination and expedition than actual management.
- <u>Strong Matrix</u>: Similar to projectized hierarchies in which a project manager has a full-time staff borrowed from functional disciplines. The project manager exerts full authority over the staff and has a full-time project administrative staff.
- <u>Balanced Matrix</u>: A combination of weak and strong matrices whereby the project manager borrows staff as needed for the project from a functional organization. The project manager has legitimate authoritative power over the project efforts and management.

Matrix organizations can be very beneficial for all parties involved for several reasons:

- The functional manager and staff have exposure to different project efforts for limited engagements.
- The staff gets exposure to other employees within other functional divisions on a recurring basis.
- Project teams are not "pigeonholed" into particular types of projects based on skill sets.
- The replacement of project team members or rollover to other functional experts is smoother.
- Project managers can deal with day-to-day project issues with limited concern for staff administrative issues.

Organizations and their impact are discussed in more detail in the Organizational Breakdown Structure subsection within the Project Planning

Project Management Organizational Structure

Phase section.

Projects arise out of needs. And the entire project management process begins when someone declares a need. The project, then, takes on many different forms depending on the stated needs. Figure 1.3, below, depicts a generally accepted process flow of managing the steps in the project.

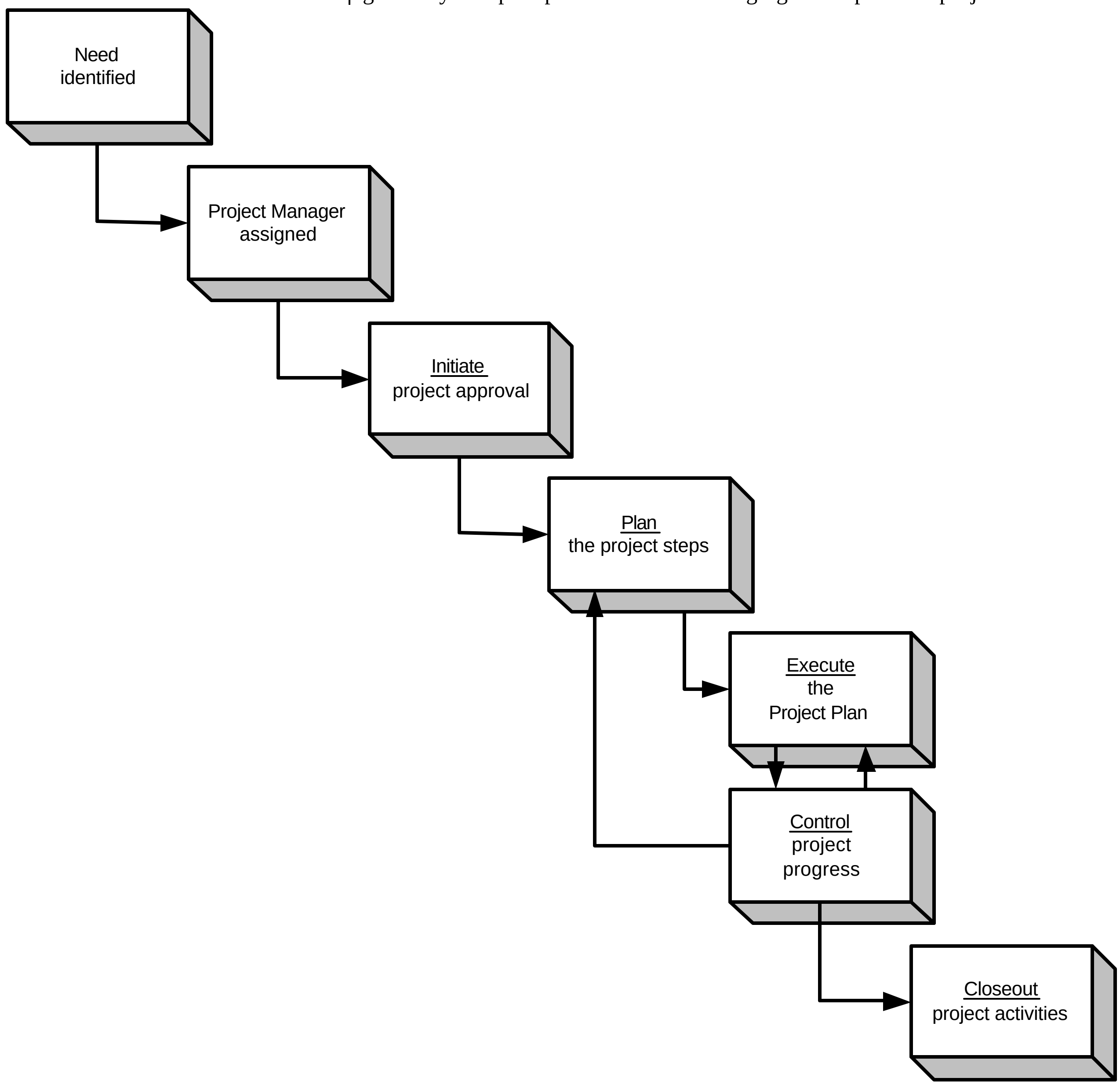

Figure 1.3
Process Flow of Project Management Phases

Active Project Transition Process

Active Project Transition Process

The Active Project Transition Process was added in the May 2001 release of the State's Project Management Methodology (PMM). Originally introduced by the Michigan State Police's Project Office, this template was designed to help projects that are already into the Planning or Execution phase, to begin using the State's Project Management Methodology's formal processes and templates.

The Active Project Transition Document should be completed by the assigned project manager. The project manager will be instrumental in garnering the necessary approvals/signatures for this document. Information should be gathered from existing project documentation, as well as information from project team members.

Usage Criteria

The Active Project Transition Process may be utilized if the project is currently under way. The project being transitioned to the PMM is typically in its mid to late planning stages, or early execution. It is advised that projects in the early to late initiation stage or in the early planning stage should use the full PMM including the use of the Project Concept Document and Project Charter.

Projects in mid to late execution stages may be better off staying with the current methods and processes in use on those projects. This decision needs to be made by the project manager, the project sponsor, and other project stakeholders.

Eligible Projects

The following circumstances may precipitate the use of the Active Project Transition Process:

- A project that has been ongoing and active prior to the agency's adoption of the PMM
- A project that has been transferred from an area that has not implemented the PMM to an area where the PMM is in use on all projects
- An effort has grown from a "task" or an "activity" to a full scale project without project participants realizing it

Keep in mind that other projects may be eligible for the Active Project Transition Process as well, and need to be evaluated on a case by case basis.

Expectations for Projects Transitioned to the PMM

After the project manager has utilized the Active Project Transition Process using the provided template, it is assumed that the PMM will be followed from that point on, through project completion. The project manager needs to ensure that the remaining processes and templates in the remaining project phases be followed, including:

- Remaining Project Planning activities/processes
- Remaining Project Execution and Control activities/processes
- Closeout activities/processes

Description of the Active Project Transition

The template is broken into 13 main areas, as follows:

A. General Information

Active Project Transition Process

Template

B. Business Problem
C. Project Goals
D. Critical Success Factors
E. Project Scope
F. Project Impact
G. High Level Project Plan
H. Deliverables
I. Resources
J. Financial Information
K. Schedule Information
L. Current Status
M. Risk
N. Project Review and Approval

The user of this template may make alterations based on the progress of the project being transitioned.

The template has been designed to be self explanatory. A template for creating the Active Project Transition Document is available after this sub-section and in Appendix B.

Active Project Transition Template

The Active Project Transition Template ican be found on the Following Page, as well as in Appendix B..

Active Project Transition Template

State of Michigan
(Insert Agency Name Here)
Active Project Transition Document

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Purpose

Information in this section discusses the reasons that the Active Project Transition Document has been created and provides an overview of the project. Note, documentation that addresses any of the information requested in any of the following sections can be reference or attached.

C. Business Problem

Describe the business problem or issue that required resolution and the impact of the business problem or issue on the agency. Identify any negative consequences to the agency that would have occurred if the project had not been implemented.

D. Project Goals

Identify the expected outcomes of the project.

E. Critical Success Factors

Identify the critical success factors (metrics or measures) of the project that define project success.

F. Project Scope

Define the scope of the project that includes identification of what is to be included in the project and what is not to be included in the project. If different from the initial project scope, please explain.

Active Project Transition Template

G. Project Impact

Identify the organizational areas, information systems and other projects impacted by this project.

H. High Level Project Plan

Identify the high-level activities that were identified to complete the project. Indicate whether each activity has not started, has started, or has been completed. If an activity has been started but not completed, indicate the percent complete.

I. Deliverables

Identify the deliverables of the project. Indicate whether each deliverable has been completed and accepted. If a deliverable has not been completed and accepted, indicate the percent complete.

J. Resources

Identify the internal and external resources that are currently, or planned to be, utilized during the project. Include effort hours by time period for each identified resource.

Personnel Category	Resource Name	J	F	M	A	M	J	J	A	S	O	N	D
Project Manager													
Project Coordinator													
Programmers													
Senior													
Junior													
Technicians													
Senior													
Junior													

Active Project Transition Template

Quality Assurance													
Other													
Other													

For external resources, identify the name of the external resource (vendor). For each external resource (contract) being used, define the scope of services to be provided. Also, outline the terms and conditions of the contract such as the amount of the contract, the contract effective period, payment terms, etc.

K. Financial Information

Identify the budget for each of the milestones included in the acquisition or development, implementation and ongoing maintenance of the project. For each of these milestones, identify the funding status (not currently funded, fully funded or partially funded). Also identify the funding source (general fund, grant funding, etc.). If funded with a combination of funds, identify the percent allocation.

Milestone	Budget	Funding Status	Funding Source
Milestone 1			
Milestone 2			
Milestone 3			
Milestone 4			
Milestone 5			
Milestone 6			
Total Project			

Document any assumptions made while developing the project budget and current status.

L. Schedule Information

Identify the schedule for each of the milestones included in the acquisition or development, implementation and ongoing maintenance of the project.

Milestone	Duration	Est. Start Date	Est. Completion Date
Milestone 1			
Milestone 2			
Milestone 3			
Milestone 4			
Milestone 5			
Milestone 6			
Total Project			

Document any assumptions made while developing the project schedule and current status.

Active Project Transition Template

M. Current Status

Provide an update regarding the current status of the project, which includes a description of significant accomplishments to date. Also, include the current status of the budget (estimated versus actual costs) and schedule (estimated versus actual duration of each milestone).

N. Risk

Describe any potential risks that may occur and the impact (positive or negative) on the project if the risk occurs. For each potential risk, identify the probability (likelihood of occurring, expressed in a percentage) of occurrence and, if quantifiable, the impact or potential cost if the risk occurs.

Risk	Probability of Occurrence	Impact

Describe actions that can be taken to prevent the risks identified above from occurring and any associated costs of the prevention strategies.

Document any comments or concerns pertaining to the project.

O. Signatures

Signing below indicates that the respective organizational areas agree with the project as outlined above. Signatures should be obtained from the Project Manager; business areas impacted by the project in that they are responsible for providing resources for the successful completion of the project; and Sponsor(s).

Name/Title	Signature	Date

Project Screening and Selection

The Assessment Process

Every project starts with an idea. That idea may be the result of a unique thought or design, it may respond to a regulatory mandate, it may answer a call for operational maintenance, or it may be as simple as providing scheduled updates. In essence, projects are generated for many different reasons; however, projects warrant special consideration for uniqueness, importance, cost, priority, and duration of effort. Accordingly, potential projects, so as not to underestimate their value-add and timing, need to be subjected to an assessment process that will allow the sponsor, stakeholders, project team, and other interested parties to validate the potential project benefits and timing.

Because many teams are initiated without regard for need and feasibility, an assessment process that includes valuation criteria should be pursued in order to ascertain the merit of the project itself. Major component phases of the assessment process may include, but may not be limited to, the following:

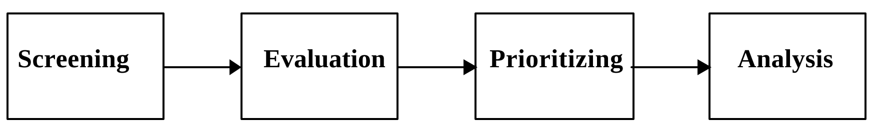

Figure 1.4
Project Assessment Phases

<u>Screening</u>
Typically, the screening phase consists of collecting data for determining whether the project belongs to a particular agency or organization and for preparing inputs for the Evaluation Phase. The perceived urgency of implementing ideas as a project will determine the timing in preparing data for review. This phase of the effort should be a quick and inexpensive exercise.

<u>Evaluation</u>
The Evaluation Phase builds on information gathered in the Screening Phase and provides, in greater detail, potential project information that will be used for evaluation. This information is then used to make such determinations as whether the idea warrants a project effort, whether the idea integrates into the agency strategy, whether the idea fits within current budget constraints, and whether the idea conflicts with ongoing projects. It will help detail the protracted benefits of the project.

This phase may require the input of outside experts or the utilization of computational analysis, or it may include the use of technological forecasting. The results of the Evaluation Phase may indicate that the idea can be considered a project. This would lead to prioritizing the implementation of this project with regard to the current agency workload.

Project Screening and Selection

Prioritizing

In the Prioritizing Phase, each idea (if there is more than one idea or if there is a comparison with ongoing projects) is weighted and appraised in terms of its relative strengths and weaknesses. This weighting would not only determine its individual merit as a project to pursue, but it would indicate a relative strength compared to ongoing projects. In order to determine whether to pursue this project, a number of various techniques may be used. A few of the more generally accepted procedures are listed:

- **Checklist/Scoring Models** – a spreadsheet-type analysis weighting various projects.
- **Cost Benefit Analysis** – a comparison of benefits from completing the project versus the outcomes of not instituting the project (this must be carefully considered when the benefits are difficult to measure; e.g., conducting a training seminar vs. installing a telefile system).
- **Risk Analysis** – an analysis of issues created while the potential project is being conceived. The intent in Risk Analysis to try to quantify concerns that could possibly impede project progress and deter outcome. (A most popular and useful technique used in analysis of a system is the Failure Modes and Effects Analysis—FMEA.)
- **Decision Trees (flow networks)** – a method for depicting and facilitating the analysis of problems that involves sequential decisions and variable outcomes over time.

It is hoped that any, or all of these, techniques will be useful in determining the relative merit of projects. Summarily, the results of this Prioritizing Phase will lead to an initial allocation of resources (human, capital, financial) in beginning the efforts of the project.

Analysis

Analysis of enterprise considerations defines the final phase of project assessment selection. If the results of the Evaluation Phase indicate that the project should replace an ongoing project, then it will be necessary to analyze how to re-allocate resources to the new project while an ongoing project is temporarily put on hold or perhaps terminated. The process of going through an Analysis Phase will be used, of course, only if projects are competing for the same resources.

An Assessment Matrix

An Assessment Matrix, as referenced in the Prioritization Phase, provides a method for making decisions among alternatives based on their key components and benefits. When a senior executive must choose between two or more options, an assessment aid will provide straightforward, quantitative information that can be easily and quickly used to support decisions. Figure 1.5 displays an example of a filled-in weighting, assessment method that may be used in conjunction with agency- generated criteria (see Figure 1.6 as an example) in determining relative merits of projects.

Project Screening and Selection

Project	Resources	Duration	Risk	Cost	Rating
Project New	**3**	**3**	**5**	**3**	**14**
Project 1	**1**	**1**	**1**	**3**	**6**
Project 2	**3**	**1**	**3**	**3**	**10**
Project 3	**5**	**3**	**3**	**3**	**14**
Project 4	**3**	**5**	**2***	**5**	**15**

Arbitrary decision

Figure 1.5
Assessment Matrix

Project Size	Resources	Duration	Risk	Cost
Small = 1	< 5	< 3 months	No impact	< $50K
Medium = 3	< 10	< 6 months	Impacts Divisions	< $250K
Large = 5	> 10	> 6 months	Impacts other Agencies	> $250K

Figure 1.6
Example Assessment Legend

Ranking

A simple Likert ranking scale (1, 3, or 5) can be easily applied to choosing how projects are prioritized and implemented. The following ranking scale applies to the example above:

- A score of 4 to 8 = a small project
- A score of 9 to 15 = a medium project
- A score of 16 and higher = a large project

Because different agencies have different internal requirements, each agency should determine the best methodology for implementing an assessment scheme for its use.

When Not to Formalize a Project Effort

The formalization of project efforts is as unique as there are numbers of projects being undertaken and agencies undertaking them. However, it is generally accepted best practice that the establishment of project activities (scope, plan, WBS, scheduling, and other project components as described in this methodology) need not be formalized for efforts with less than three people, whose duration does not exceed one month.

Essentially, an assessment approach should be kept flexible enough so that the effort and results are consistent with the size and complexity of the alternatives being evaluated, life cycle phase, and level and type of review being supported.

Information Technology Components for Project Overview

Information Technology Components for Project Overview

Information technology projects are very similar in nature to non-information technology projects in many respects. From the aspect of a project definition, IT projects are still temporary in nature and have a clear start and end date, a defined set of deliverables, and a limited budget. The goal is still to develop a new or unique product. The subtle difference lies in the steps taken to develop the IT product.

Information Technology Project Definition

IT projects consist of applying the people, process, and tools to initiate, plan, execute, control, and close out projects relating to computer-based information systems. IT deliverables are normally created using what is referred to as the System Development Life Cycle (SDLC). The SDLC is a very detailed and specific set of procedures, steps, and documents that carry a project through its technical development. The focus of the IT subsections within this methodology is not to concern the project manager with how the IT product is created within the SDLC. Rather, it is intended as a guide to assist in deciding on what project management concepts must be applied during the development of an IT product to ensure that a quality deliverable meets or exceeds customer expectations.

The System Development Life Cycle can be seen in Figure 1.7, below.

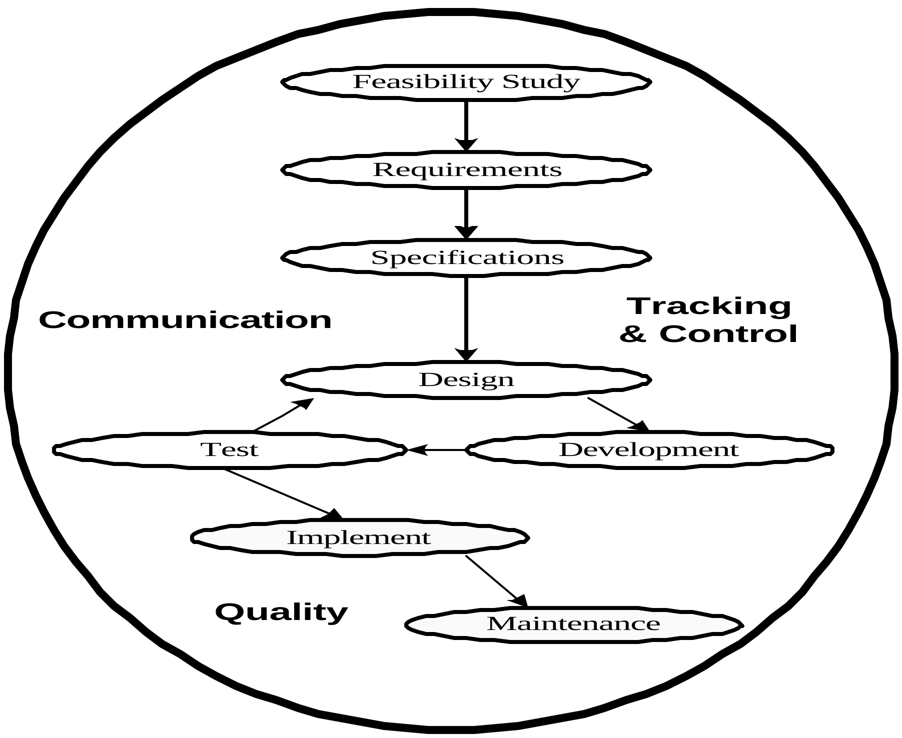

Figure 1.7
System Development Life Cycle

Information Technology Components for Project Overview

Applying Project Management to Information Technology

Project management is broken down into five phases: Initiation, Planning, Execution, Control, and Close- out. As described in the previous paragraph, information technology projects can be broken down into the same phases; however, within those phases, several SDLC processes are performed (e.g., requirements definition, design, development, testing, operations). These processes have been created and are maintained at an agency level. However, it is very easy to get wrapped up in the technical development of the IT system itself and forget the management-level concepts and deliverables.

A project manager's responsibility is to maintain a high-level perspective of the technical development within the project and ensure that the core project management concepts are being applied to create the project framework. This includes creation of the documents and plans that are described throughout this methodology. While there will be times on small projects when project managers will be involved in the technical development of the product, the most important duty is to ensure that the project is coordinated and carried out as smoothly as possible to the satisfaction of the customer.

Considering the fact that the System Development Life Cycle and Project Management Methodology are two different processes, it may be difficult for the project manager to distinguish between the two and discern his or her role within each process. The intent of this portion of the methodology is to integrate the need for project management with the processes performed in the System Development Life Cycle. For example, much of the preparatory work for development of an IT product takes place within the requirements and design phase of the SDLC. However, from the Project Management Methodology perspective, these activities take place during the Planning Phase of the product development. Clarifying and separating the project management roles from those of technical development of the product is of significant importance to ensure that proper project management concepts are initiated and performed.

Figure 1.8, on the next page, compares the Project Management Phases against the steps in the System Development Life Cycle over time. Note that the solid line is the level of effort on the Project Management Phases side (greater during the Planning Phase) and the dotted line is the level of effort on the System Development Life Cycle side (greater during the Execution and Control Phases).

Why is Project Management Important to Information Technology?

The reason that project management is applied on IT projects is to maximize the quality and productivity while minimizing the risks of a technology effort.

Project management is no longer something done in the executive office without any attention paid to the technical detail of the product. The technologies being used in IT projects are becoming more complex, and many projects require integrating several technologies. No one person in an organization is going to have the vast technical knowledge to understand the integration of several technology platforms on a large-scale project.

Therefore, there is a defined need to have a coordinator, such as the project manager, to ensure that necessary skills will be available when needed and to ensure smooth transition from phase to phase and technology to technology. Similarly, as agencies strive to become more matrixed in their approach to project coordination, efforts among the functional technologies will increase.

Information Technology Components for Project Overview

Having trained and knowledgeable professionals with specific skills to perform the work will be of paramount importance to delivering exceptional projects.

Furthermore, during a time when information technology outsourcing has become increasingly more acceptable, it is important that agency information technology organizations improve their performance and abilities. It is reasonable to assume these days that contractors can be brought in, even at greater expense, to provide technical services if they have the project management skills and processes desired by executive management. Remember, the technology of the project is the same for everyone. It is the management of the processes that make the difference.

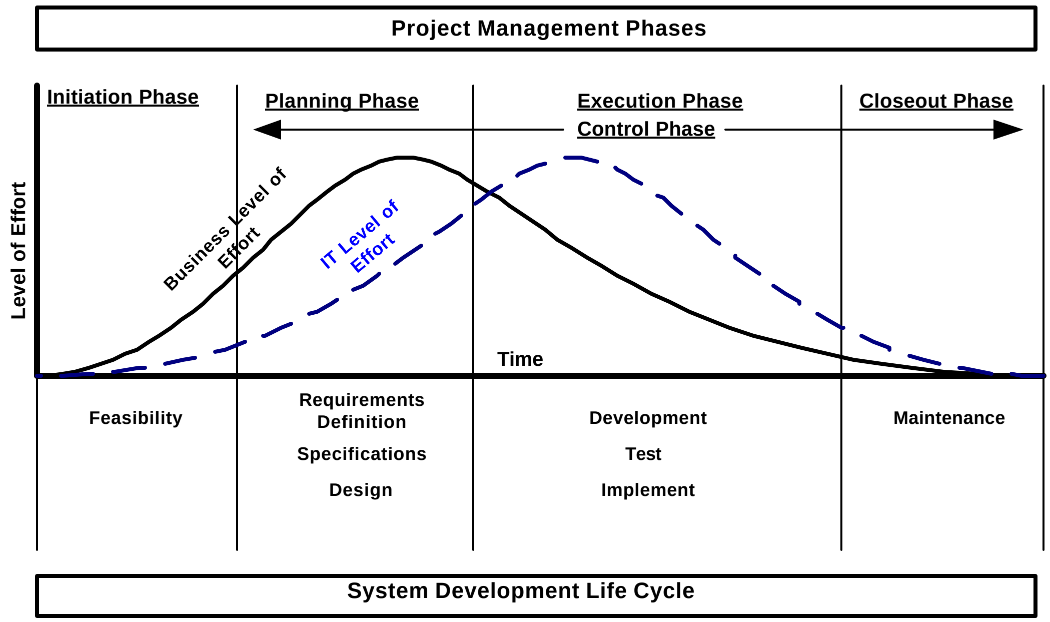

Figure 1.8
Project Management Phases Compared to the System Development Life Cycle

Information Technology Components for Project Overview

Problems with Managing Information Technology Projects

There are several reasons that IT projects have historically been more difficult to handle than other types of projects. IT projects can be managed in the same way that other projects are managed, but managers have often had difficulty applying the project management methodologies to technical projects. Some of the more common problems identified with IT project management are listed below.

Continuity Among Management Efforts Does Not Remain Consistent
IT projects typically focus on the technical issue at hand without anyone to provide oversight from a management level. Someone within the organization needs to provide leadership and accountability for high-level planning and for the work involved to do in that planning. This is the role of the project manager.

Information Technology Projects Are Not Planned Well
Technical endeavors are normally carried out by staff expected to apply their technical skills to the project. It is rare to find technical experts who have the fundamental project management skills to carry out the high-level planning functions for anything other than technical requirements. Once again, someone with project management skills will need to step in to provide guidance and ownership for the Planning Phase and beyond.

Lack of Knowledge of Fundamental Project Management Practices
Technical project team members need to be made aware of the core project management processes and they need to develop an understanding of how their responsibilities play into the overall project process. Their input will be the basis for process as well as technical documentation during the project. Conversely, the project process documents they create will have an impact on how they will perform their jobs.

Projects Change Over Time
Technical requirements may change on a daily basis. Being able to understand and apply processes that will facilitate managing change is a part of project management that will apply to all IT development efforts. Making changes using defined project management will provide needed project management structure to IT development.

Budgets Affect All Types of Projects
The System Development Life Cycle does not have a specific area in which issues of budget are addressed. Defined and applied structure in areas such as budget and cost management are core processes that apply to IT projects but are not accounted for in their development. The same holds true for areas such as communications, risk, procurement, and others.

Problems with Information Technology Projects Are Not Necessarily Technical
There are several reasons that IT projects have historically been more difficult to handle than other types of projects. IT projects can be managed in the same way that other projects are managed, but managers have often had difficulty applying the project management methodologies to technical projects. Some of the more common problems identified with IT project management are listed in succeeding sections.

Information Technology Components for Project Overview

Information Technology Project Management within the Project Management Life Cycle

As you review the subsections of each of the five project phases, you will notice that there is a particular subsection in each phase named "Information Technology Components." It is important to note that project managers will not be able to manage an IT project simply by reviewing these as standalone sections. It is imperative that project managers read, understand, and apply the skills and the processes described in the other subsections to guarantee project completion. To assist with this, the other subsections within the phases will be referenced within the IT subsection for the convenience of the reader.

PROJECT MANAGEMENT METHODOLOGY

SECTION 2 -- INITIATION PHASE

Section 2: Project Initiation

Table of Contents

Section 2: Project Initiation

Introduction

Project Initiation Overview

Project initiation is the conceptual element of project management. This section describes the basic processes that must be performed to get a project started. Accordingly, the purpose of the Project Initiation Phase is to specify what the project should accomplish. The caution in specifying this purpose is that if the customer's needs are inadequately articulated, then poorly formulated goals and objectives will stand out as a significant source of concern. A high-level discussion on phase deliverables is contained in this section as well. In addition, the high-level barriers, potential problems, and roles and responsibilities of project initiation are summarized. The Project Feasibility Document is discussed as a device to document the need for the project and to document potential high-level solutions to solve the business problem at hand.

Project Concept Document

The Project Concept Document (PCD) provides an understanding of what the project, if initiated, is designed to accomplish or produce. It involves an in-depth understanding of why an agency is interested in spending money and applying resources to undertake a new project. The Project Concept Document and its inputs are described in detail in this subsection.

Project Charter

The Project Charter is the document that communicates the existence of a project after it has been selected for implementation or creation. It contains vital information about the project and its leadership. This subsection describes the Project Charter and its impact in greater detail.

Information Technology Components for Project Initiation

This subsection describes considerations that assist in the development of initial documentation and processes for System Development Life Cycle (SDLC) types of efforts.

Relationships among the Initiation Phase processes, of which the project manager must be aware, are depicted in Figure 2.1 below.

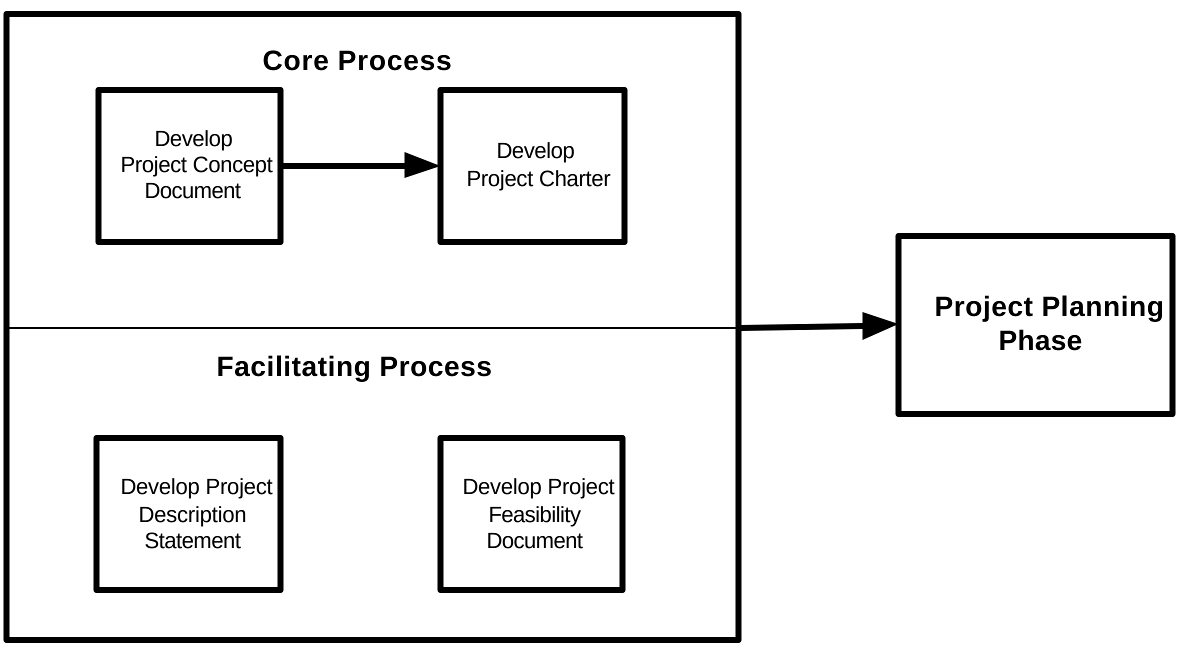

Figure 2.1
Relationships Among the Initiation Processes

Overview

The Initiation Phase

This section of the State of Michigan Project Management Methodology is related to the Initiation Phase of a project. Although at times there is no uniform agreement on the specific stages of a project and the associated management processes that follow, there is agreement that for a project to exist, it must begin.

The starting point is critical because it is essential for those who will deliver the product/process, those who will use that product/process, and those who have a stake in the project to reach agreement on its initiation. The process is represented in Figure 2.2 below.

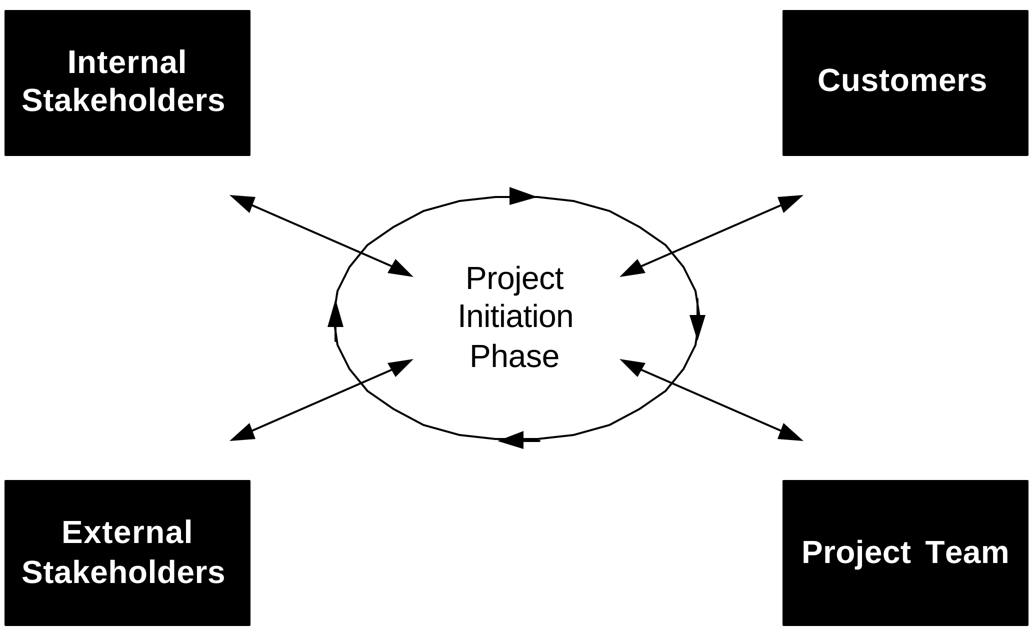

Figure 2.2
Contributing Factors in the Initiation Phase

Elements of the Initiation Phase

Defined in this subsection are general guidelines to assist in defining the overall parameters of the project during the Initiation Phase. The subsections have been organized to be consistent on how a project might progress through the Initiation Phase.

It must be stressed that the recommended methods in this section are standard steps for project efforts, because it is here that agreement is reached on what the project's end product(s) will be. The following are the basic processes for the Initiation Phase:

- Development of business needs
- Development of purpose and objectives
- Creation of a Product Description Statement
- Selection of an initial due date

Overview

- Development of resource costs
- Development of a Project Feasibility Document
- Development of a Project Concept Document, and
- Creation of the Project Charter

For Small to medium-sized projects, the Project Feasibility Document, the Project Concept Document, and the Project Charter may be combined into fewer than three documents. The project manager and project sponsor(s) need to make this call.

Each of these processes will be discussed briefly below and addressed fully in the associated subsections of Project Initiation.

Product Description Statement

The Product Description Statement is an informal, high-level statement contained within the Project Concept Document (see below) that describes the characteristics of the product/process to be created. It explains what purpose the new product/process is intended to serve and what brought about the need for the product/process. Typically, a Product Description Statement does not have a great deal of detail and will be used as a basis for building progressively more detailed descriptions during the Planning Phase.

Project Feasibility

The determination of project feasibility (see the template example at the end of this subsection) plays an important part in the development of the Initiation and Planning Phase documentation. The determination can also be an abstract planning document without a formal template. However, its importance should not be overlooked. The purpose of this effort is to identify project constraints, alternatives, and related assumptions as they apply to the product/service to be developed. This material has been organized to support the material already presented in the Project Concept Document. Every caution should be taken to keep these activities at a high level in the organization so that they do not result in a project design.

There are four basic components to project feasibility:

- Business problem description
- Approach overview to be used
- Potential solutions for the problem, and
- Preliminary recommendations

The Project Concept Document

The Project Concept Document defines the project’s reason for being and ensures that the project is consistent with the agency’s business plan and, when applicable, the agency’s information technology strategic plan. As a formal deliverable, it defines a high-level approach, critical success factors, a Product Description Statement, and other top-level planning information. Ideally, the information contained in the Project Concept Document provides both internal and external management with the information necessary to decide if the project can be supported. A detailed description of this document and its contents is available in the Project Concept Document subsection in this section.

The Project Concept Document should not be a collection of product or

Overview

process deliverables, but should define what is to be done, why it is to be done, and what business value the project will provide to the agency when it is completed (see Figure 2.3 below).

The Project Concept Document is the foundation for initiation of the project, which occurs via the Project Charter. Without the Project Concept Document, there is no project idea to review or approve.

Project Charter

The Project Charter is created to formally communicate the existence of a project. The Project Charter is issued at the end of the Initiation Phase and is a beginning to the Planning Phase of a project. The Project Charter is used as the basis to create the Project Plan.

The Project Charter is used to formally initiate a project. Inputs to develop it may be a project feasibility document, a Project Concept Document, a formal business case, and other documents that identify a need and establish a senior management commitment. The Project Charter and its development are discussed further in the Project Charter subsection in this section.

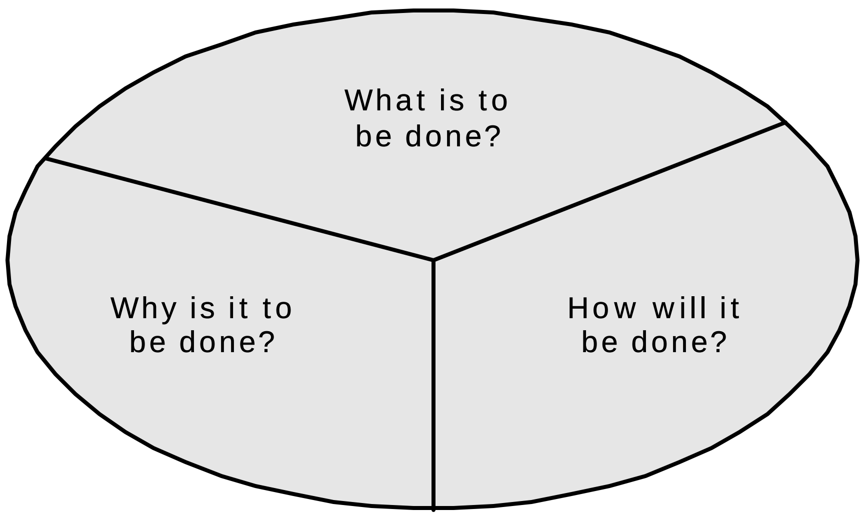

Figure 2.3
Major Questions to Be Answered During the Initiation Phase

Document Flow for Initiation Phase

Figure 2.4 explains the document flow for the Initiation Phase.

Section 2: Project Initiation

Overview

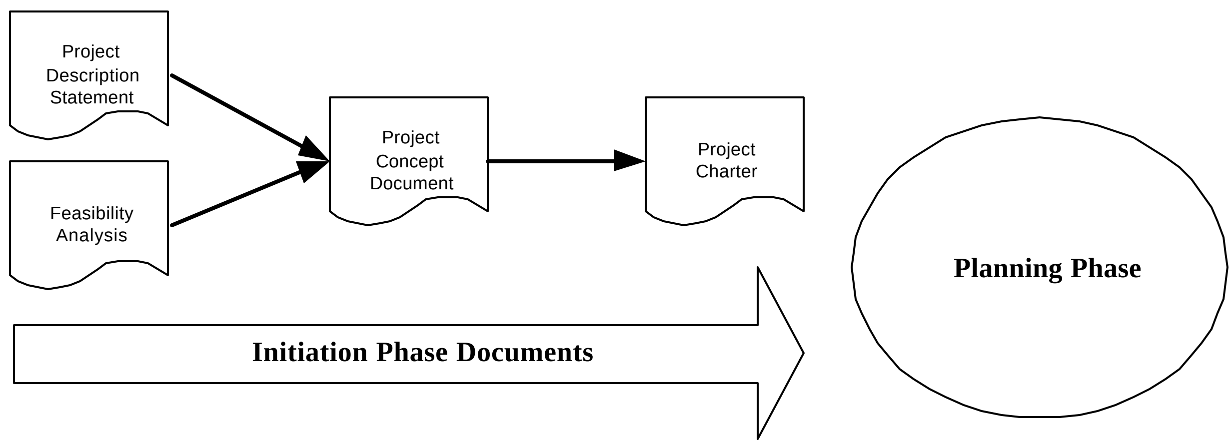

Figure 2.4
Document Flow for the Project Initiation Phase

Potential Barriers to Project Initiation

Indecision and hesitation can mark the atmosphere during the Initiation Phase. These potential barriers are characterized by the following attitudes:

- **Project Team Frustration**
  The project staff wants to get the project moving and to start designing the solution, which never seems to come.
- **Lack of Management Commitment**
  There is a lack of full commitment on the part of management; usually too little is known with just a "fuzzy" idea of the project, and the project teams cannot provide more than rough estimates for "how much and how long."
- **Customer Indecision**
  The customer seems unable to provide definitions and concepts of what the required product or service is to provide.

Problems During the Initiation Phase

Many problems during the Initiation Phase are due to the difficulty in getting a project moving forward. This may be a direct result of the atmosphere defined above. The most difficult commitments to obtain are from the key stakeholders (top management) and the customers. Some of these problems are summarized below:

- **Scarcity of Resources**
  Many of the problems are related to assembling the initial project concept team. Locating the right people can be difficult, and this difficulty is compounded by more complex projects.
- **Lack of Coordinated Leadership**
  While qualified team members may be in short supply, individuals serving as leaders may be numerous. Sometimes, the Initiation Phase is led by too many people—some for the estimating, some for the customer meetings, and so forth. Such environments create an atmosphere of bad or disjointed decision making.
- **Lack of Consensus on Project Objectives**
  It is not uncommon to find that there are many different ideas as to what

the project should be and what the project should produce. Concepts are often easier to integrate when the team is considering something concrete. Lack of objectives can kill a project before it starts

- **Lack of Management Support/Sponsor**
  Unfortunately, sometimes there is a recognized need for a project to be initiated, but there is no one to champion the effort from an executive level. People may not support a project for a variety of reasons. This can be a huge issue should problems result later in the project. If additional funding or resources are needed and the management executives who control the funding are either not aware of or not interested in the project, then a project may fail. Top-level management buy-in must happen at the project inception and be visible throughout the life of the project.
- **Lack of Business Strategy and Expected Outcomes**
  Occasionally an organization will take on a project that does not have a clearly defined relationship to its business. To keep this from happening, the agency's business strategy needs to be visible and understood so that the results of a project effort can be considered as a part of the agency's strategic goals and business strategy. Using the agency's business strategy and strategic objectives as a baseline for consideration for project initiation will save time and effort later.

Project Initiation Roles and Responsibilities

Following are the roles and responsibilities for the Project Initiation Phase:

The Project Team: Conducts customer, stakeholder, and fact- finding interviews and holds research and brainstorming sessions to generate the information necessary for the Project Feasibility Document, the Project Concept Document, and the Project Charter to be prepared. Project team members may also need to complete any ancillary Project Initiation Phase materials.
The State Agency: Establishes internal procedures to ensure that conceptual activities are completed and the Project Feasibility Document, the Project Concept Document, the Project Charter, and any associated documents are completed in a manner that allows for productive review.
The State of Michigan: Participates as requested in concept planning steps and reviews submitted concept documents (for high-risk and high-cost projects).

Selection of a Project Manager

Project Manager Responsibilities
Selection of a project manager is not easy, nor is it something that should be taken lightly. A project manager's skills and actions are a direct reflection of the agency's commitment and competence in project management. A project manager's daily responsibilities typically include some or all of the following:

- Providing direction, leadership, and support to project team members in a professional manner at project, functional, and task levels.
- Using, developing, and improving upon the project management methodology within the agency.
- Providing teams with advice and input on tasks throughout the project, including documentation, creation of plans, schedules, and reports.
- Resolving conflicts within the project between resources, schedules, etc.
- Influencing customers and team members in order to get buy-in on

decisions that will lead to the success of agency projects.
- Delegating responsibility to junior team members.

Selection Criteria
Taking these responsibilities into account, it is easy to see that a project manager should not necessarily be selected from an agency based strictly on tenure or function but rather based on a combination of other strengths. A project manager should be selected based on the following skills and experience:

- Project management methods and tools skills
- Interpersonal and team leadership skills
- Basic business and management skills
- Experience within the project's technical field, and
- Respect and recognition among peers within the agency

Selection Method
Selecting a project manager based on these criteria alone would be hard enough, but more thought needs to be put into the process. Additional information would include visibility and size of the project and experience, availability, and personal interest on the part of the candidate.
Project leaders being considered for small projects should have some training in the project management methodology and tools used within the agency. They should also have an interest in and reasonable knowledge of the product or process that is being created by the project. It is a good idea to select someone who has been through at least one project as a team member under a senior project manager within the agency, so that the person will have seen the level of competence expected from the agency on other projects.

Midsize projects need leaders who have experience on several small, focused project efforts. By this time they have developed their general management and business skills to the point that they can manage people and technology by delegation. Midsize projects typically incorporate more than one technology type or functional group, and the project manager needs to be savvy enough to manage several different functional groups with different needs. The level of confidence and competence must increase on these projects because they involve increased visibility.

Large projects are those that are agency-wide or may extend outside the agency itself. In these cases, project managers should have led many high-profile midlevel project engagements and be well recognized for their efforts. A project leader at this level must be able to understand the technology being used but not necessarily be an expert in it. Project managers will be spending most of their time working the planning and controlling aspects of the project as well as dealing with the "political" issues. Delegation, time management, and interpersonal skills are keys to success. The person must have the unwavering confidence of agency management and be considered an acceptable and well-liked representative for the agency.

Finally, be sure not to overburden particularly effective project managers. Customers and team members tend to request project managers that they like or have had good experiences with. While this is good for the agency, it can

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lead to managers being assigned to too many efforts at a time and result in frustration or burnout. Be sure to spread the opportunities throughout the agency and integrate new, inexperienced project managers whenever possible. This increases the agency's project management arsenal and keeps senior level project managers focused on the more important, higher level activities.

Project Feasibility Document Template

The determination of project feasibility (see the template example at the end of this subsection) plays an important part in the development of the Initiation and Planning Phase documentation. The determination can also be an abstract planning document without a formal template. However, its importance should not be overlooked. The purpose of this effort is to identify project constraints, alternatives, and related assumptions as they apply to the product/service to be developed. This material has been organized to support the material already presented in the Project Concept Document. Every caution should be taken to keep these activities at a high level in the organization so that they do not result in a project design.

There are four basic components to project feasibility:

- Business problem description
- Approach overview to be used
- Potential solutions for the problem
- Preliminary recommendations

Project Feasibility Template

State of Michigan
(Insert Agency Name Here)
Project Feasibility Document

A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the proposed project and project participants.

Project Name:	____________	***Date:***	____________
Controlling Agency:	____________	***Modification Date:***	____________
Prepared by:	____________	***Authorized by:***	____________

B. Business Problem:

Information in this section discusses the reasons the Project Feasibility Document has been created and what the project is intended to accomplish.

Current Situation:

Provide a brief description of the current situation.

Factors or Problems:

This statement should be a short snyopsis of the relevant factors, or problems, being faced by the functional area(s).

Areas Impacted:

This should be a brief statement regarding other areas impacted.

Resolution Date:

Determine, as accurately as possible, a resolution date to the problem.

C. Approach Overview:

This section is used to list elements that will determine the course that the proposed project will take.

D. Potential Solutions:

Information in this section discusses the potential solutions to the problem in the Project Feasibility Document.

Project Feasibility Template

Solution 1:

Description	
Resources	
Cost/Benefit	
Payback/Return on Investment	
Schedule	
Implementation Considerations	
Reasons to Abandon	

Solution 2:

Description	
Resources	
Cost/Benefit	
Payback/Return on Investment	
Schedule	
Implementation Considerations	
Reasons to Abandon	

Solution 3:

Description	
Resources	
Cost/Benefit	
Payback/Return on Investment	
Schedule	
Implementation Considerations	
Reasons to Abandon	

Project Feasibility Template

E. Preliminary Recommendations:

This section reviews the preliminary recommendation based upon the areas impacted by this recommendation or the operational protocol.

Recommended solution:

Recommended justification:

F. Signatures:

This section is for approval signatures by the project team members, sponsors, stakeholders, and management.

	Name/Title	**Signature**	**Date**
Requestor			
Team Member who prepared plan			
Team Member			
Team Member			
Team Member			

DECISION ☐ Accept ☐ Reject ☐ On hold ☐ Need Clarification ☐ Other

	Name/Title	**Signature**	**Date**
Technical Approval			
Business Approval			
Finance Approval			

Project Concept Document

Project Concept Document (PCD) and Initiation

Each project is unique and must be individually defined.

While the Project Description Statement (part of the Project Concept Document) and project feasibility are key support elements in project implementation, the Project Concept Document is the foundation for making a decision to initiate.

Projects will vary in terms of complexity, but all should have some level of initial concept definition. For some projects, it may take only a few hours or days to complete this document; for others, it could take months. This document is critical to guaranteeing buy-in for a project.

Figure 2.5 below shows the relationships between the various project phases. The Initiation Phase is the first project phase and is the predecessor to project planning. Activities conducted during the Initiation Phase will eventually be integrated into the various planning documents and will drive the planning elements, such as schedule and budget.

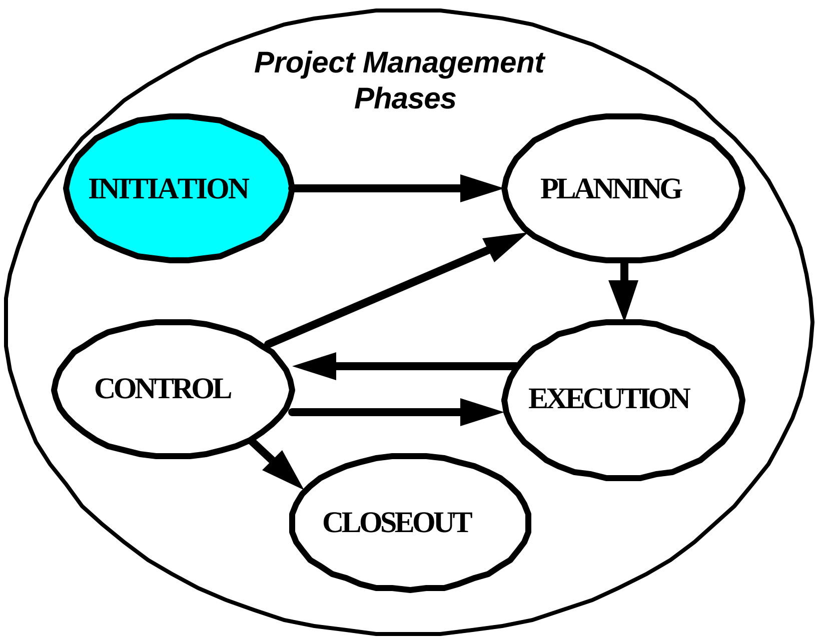

Figure 2.5
Project Management Initiation Phase

Project Concept Document

Elements of the Project Concept Document

One of the most important tasks in the Project Initiation Phase is the development of the Project Concept Document. To develop this document, the State agency identifies the following participants:

- Project Manager
  Although a project manager may not have yet been selected, this lead person will define the project purpose, establish the critical success factors, gather strategic and background information, determine high-level planning data, and develop estimated budgets and schedules for the life of the project.
- Project Team
  As appropriate, depending on the size of the effort, a project team is identified to perform the initial concept study.
- Concept Participants
  These organizational entities and individuals need to provide input to the Project Concept Document to clarify project direction.
- Stakeholders and Customers
  These individuals and entities could be actively or passively involved in the project and may be positively or negatively impacted as the project is completed.

During this stage of the Initiation Phase, the project team defines the following variables:

- Project goals and objectives
- Consistency of the project within the state agency's business plan
- High-level approach and project strategy
- Success factors for the project

The project team will also review information and conduct meetings. At this stage, the following items should be considered:

- Appropriate methods for application and deployment of technology
- Resource requirements

The real issues during the Initiation Phase are not the written documents, but the processes used to create the documents, which truly evaluate the appropriateness of a specific project and whether it can be started. The material generated as a by-product of these processes will be reviewed to make the necessary business decisions.

The goal during this phase, and specifically with the Project Concept Document, is *not* to generate a 200-page document, but rather to provide a concise summary of information necessary to review and thus determine if the project should be initiated and carried into the Planning Phase.

Roles and Responsibilities

The levels of responsibility are as follows:

- The **Project Manager ¾** responsible for development of the project description statement and orchestration of strategy development processes.

Project Concept Document

- The affected **State Agency(ies)**—responsible for reviewing the information and participating as appropriate in the review sessions.
- **Stakeholders and Customers**—responsible for providing necessary input via interactive discussions to more fully define what the view of the project should be.
- **State of Michigan¾** responsible for providing assistance and tools as requested. The State will also review the final collection of materials related to the Initiation Phase, if requested to do so, when the agency(ies) determine that the project should be considered for acceptance, approval, and oversight determination.

How the Project Concept Document Should Be Developed

There are various methods the project team may wish to use for developing the needed concept information:

- Brainstorming sessions
- Formal executive meetings
- Stakeholder or customer meetings
- A Product Description Statement
- A project feasibility determination
- Interviews with subject matter experts

All these methods should be aimed at defining the project at the highest conceptual level that provides the necessary responses to business needs and strategic objectives.

A Decision Plan

During this project phase, the agency(ies) may determine that a top-level Project Plan should be provided to detail the information on completing the Initiation Phase and conducting the Planning Phase. This plan would not be baselined, but would be used to review the cost and time necessary to complete these activities.

This information will be especially important if the agency needs additional funding or requests incremental funding to complete additional or current phases. Again, this is a plan for conceptualization and not the Project Plan itself. The Decision Plan should contain the following information:

- Tasks to complete the project constraints and assumptions in the Planning Phase. (This should include some estimation on procurement activities if the project performance will include a contractor.) The estimated number of activities should be two to ten.
- A list of the resources needed to complete these activities.
- Estimated cost (budget) for these activities.

Time Frame for Completion

The time frame for most project teams to generate a Project Concept Document varies widely according to project size and is driven by unlimited factors. A generic sequence flow showing where each of the initiation activities (through Project Charter to the Project Planning Phase) starts and ends is provided in Figure 2.6, on the following page. This sequence flow is provided only as a guideline, because each project is unique and will require

Project Concept Document

different levels of detail, research, and development. It does not take into consideration all levels of review, which may vary between agencies.

This general sequence should be adjusted to reflect internal reviews and then used to define a general sequencing of activities.

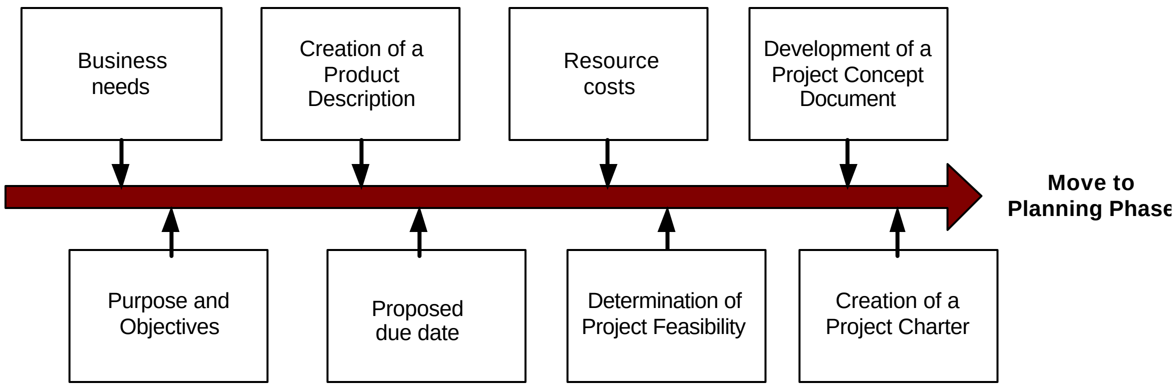

Figure 2.6
Project Concept Document Development Sequence through the Project Charter

Project Concept Document Review

There may be times when actual reviews need to be scheduled with the project team and external entities to review the Project Concept Document. These reviews would provide a forum for information exchange and would be more timely than written question-and-answer sessions.

The materials generated during the initial statement and analysis processes will drive the contents and structure of the meeting. Most likely a decision to proceed or not to proceed with the project will be a result of these meetings. If the Project Concept Document is agreed upon and accepted, then the agency should move to the next step of the Initiation Phase and create the Project Charter.

Project Concept Document

Project Concept Document Template

The State of Michigan Project Concept Document template can be found on the following pages as well as separately in Appendix B of this methodology. The Project Concept Document is the major input to deciding whether a project will be pursued and carried out.

Keep in mind that this template shows the generally requested format that is the most accepted within the State of Michigan Project Management Methodology. If it is necessary to create a Project Concept Statement other than the one furnished in the template, the statement should include the following general information categories (use of these categories should result in a valid project concept definition):

- General Information
- Project Purpose
- Success Factors
- Strategic Background Information.
- Planning Information
- Financial Planning and Strategic Information
- Signatures

Project Concept Document Template

State of Michigan
(Insert Agency Name Here)
Project Concept Document

A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the project and project participants.

Project Name: ____________ ***Date:*** ____________

Controlling Agency: ____________ ***Modification Date:*** ____________

Prepared by: ____________ ***Authorized by:*** ____________

Please answer the following questions by marking "Yes" or "No" and providing a brief response as appropriate.	**YES**	**NO**
Is this an updated Project Concept Document?	☐	☐
If "yes," reason for the update:		
Is concept development effort funded?	☐	☐
If "yes," how much?		
Is this a follow-up to a previous project?	☐	☐
If "yes," please provide name of previous project:		
Date Completed:		

Points of Contact:

Please list the individuals who will be responsible for this project during its concept stages, as appropriate. This will be the group of individuals that meets to review and discuss the project statement and sizing.

Position	Name/Organization	Phone	E-mail
Project Manager			
Project Sponsor			
State Agency Management			
Project Team			
Configuration Management			
Quality Assurance			
Customer			
State of Michigan			

Project Concept Document Template

B. Purpose

Information in this section discusses the reasons the Project Concept Document has been created and what the project is intended to accomplish.

Business Problem:

All projects start with a business problem/issue to solve.

Sample IT Project. The lack of a statewide automated planning system for scheduling transportation road repair maintenance resources has resulted in road closures, duplicated capital expenditures, and increased staff overtime costs.

Statement of Work:

The statement should be short and to the point. It should not contain language or terminology that might be misunderstood.

Sample IT Project. Design and prototype an automated, cynamic planning system by Q4,2001, based on an SQL database and GUI front end. Based on the prototype, pilot the system and complete full implementation by Q4, 2002.

Project Objectives:

Provide a brief, concise list of what the project is to accomplish.

The project objectives are a detailed version of the statement of work. Taken with the statement of work, the objectives define the boundaries (scope) of the project. The objective statement can also be seen as a decomposition of the statement of work into a set of necessary and sufficient objective statements, including:

Outcome - Be specific in targeting an objective

Metrics- Establish a measurable indicator(s) of the progress

Ownership - Make the object assignable to a person for completion

Timeframe - State what can realistically be done with available resources

Sample IT Project

1. Define the planning requirements for the system by Q2, 2001.
2. Define user needs in terms of inputs and outputs by Q2, 2001.
3. Conduct user and stakeholder meetings during Q1 and Q2, 2001
4. Develop the prototype and test, with a completion date of Q4, 2001
5. Conduct the pilot of system with completion by Q2, 2002 with the pilot lasting at least three months.
6. Complete system acceptance and user documentation by Q3, 2002
7. Complete system installation at all locations by Q4, 2002
8.

Product Description Statement:

A high-level description of the characteristics of the product/process to be created.

Project Concept Document Template

Sample. The automated planning system for scheduling transportation road repair maintenance resources will be a relational database system able to be accessed by project schedulers which provide resource availability for various road repair schedulers.

C. Critical Success Factors:

This section is used to list high-level factors that will determine the success of the project. A more detailed description of these factors will be created in the Planning Phase.

This part of the project statement should answer the question, "Why do we want this project?" It is essential that the criteria be quantifiable and measurable and, if possible, related to a business value. Best choices for success criteria are what the bottom-line impact of the project will be.

Sample IT Project

1. The prototype provides the necessary planning information as defined by the formal test criteria developed as part of the project plan.
2. The pilot installation was completed following modification defined during the prototype and documented in an updated acceptance test plan.
3. The automated planning system is fully implemented, and over 80% of the regional offices are using the tool to perform daily tasks, as verified by follow up calls.

D. Strategic and Background Information:

This section focuses attention on the compatibility of the project and the strategic and technical direction of the agency.

Please answer the following questions by marking "Yes" or "No."

Is the project consistent with the agency's Business Plan?	YES ☐	NO ☐
Briefly state:		
Is the project identified in the agency's strategic plan?	YES ☐	NO ☐
Has this plan been reviewed by the DMB, Office of Project Management, if needed? If so, what is the date of the review?	YES ☐	NO ☐

Business Functions Impacted. *Check all appropriate functions.*

Project Management	☐	Planning	☐	Document Tracking	☐	Program-specific Data Management system	☐
Human Resources	☐	Procurement	☐	Workflow Management	☐	Facilities Management	☐
Financial	☐	Help Desk	☐	Desk Top Productivity	☐	Other (Explain below)	☐

Other Business Functions:

Types of Technology: *Identify technology areas that might apply to this project, if known at this time. Check all appropriate categories.*

Project Concept Document Template

Client Server Architecture	☐	Database	☐	Expert System	☐	LAN	☐
Electronic Data Interchange	☐	Imaging	☐	WAN/Internet	☐	Desktop application	☐
Mainframe Solution	☐	Real Time	☐	C.A.D.	☐	Other (Explain below)	☐

Other Technology Areas:

E. Planning Information (internal state agency use):

This section reviews the high-level activities of the project with respect to the dates, durations, cost, etc. for future considerations.

Provide a draft list of activities to complete the concept and planning phases list. There should be approximately 2 to 10 tasks.

Activity #	# of Days	Estimated Cost	Activity Description	Milestone

Attach a schedule for these tasks if available.

F. Planning Financial and Schedule Information:

This section discusses estimated budgets, schedules and other information over the life of the entire project.

Estimated Budget	*Low:* *High:*	*Estimated Start Date:* *(Qtr. and Yr.)*	
Estimated Planning Length (Months)		*Estimated Completion Date:* *(Qtr. and Yr.)*	
Fiscal Year 1 Dollars		*Fiscal Year 2 Dollars*	

Other related information: (Be able to describe at a high level where the budget constraints are derived from.)

Project Charter

Project Charter Introduction and Definition

A Project Charter announces that a new project has begun. The purpose of the charter is to demonstrate management support for the project and the project manager. It is a simple, powerful tool.

As an announcement it has classically taken on many forms--anything from a memorandum, to a letter, to an e-mail, to the template that is advocated at the end of this subsection. The charter is then sent to everyone who may be associated with the project to give notice of the new project and new project manager.

Because the Project Charter is created to formally communicate the existence of the project, it is issued at the end of the Project Initiation Phase and is looked upon as the beginning of the Planning Phase of a project. It is used as the basis to create the Project Plan.

Inputs to developing the Project Charter are the Product Description Statement, Project Feasibility Document, and the Project Concept Document. These documents identify a need and establish senior management commitment.

Note of caution: There are typically two ways that a project charter may be interpreted. One is the way that has been described in this subsection; as a formal recognition that a new project has begun. The other way refers to what many have come to know as the Statement of Work. Both uses will probably continue to be widespread, and this note is a reminder of that fact.

The Project Charter contains the following attributes:

- General Information
- Project Purpose
- Project Objective
- Project Scope
- Project Authority
- Roles and Responsibilities
- Management Checkpoints
- Signatures

Project Purpose within the Project Charter

"Why are we doing this project?" is the question that the purpose statement attempts to answer. As part of the project charter, it is the first element that announces why this project is being undertaken. The purpose statement is of paramount importance, especially when significant amounts of time and money are involved. Knowing the answer to this question will allow the project team to make more informed decisions throughout the project.

And although there are many "whys" in the context of a project, the charter does not attempt to answer them all. Neither the purpose statement nor the project charter itself should be used as the venue on which to build a business case or a cost benefit analysis.

Project Objectives within the Project Charter

Consequently, project objectives are used to establish performance goals—planned levels of accomplishment stated as measurable objectives that can be compared to actual results. Performance measures should be derived for each goal. These measures can be quantified to see if the project is meeting

Project Charter

the agency's objectives. Project performance can then be traced directly to the agency's goals, mission, and objectives, enabling participants to correct areas that are not meeting those objectives.

Project Scope within the Project Charter

Project scope is documented at a high level in the Project Charter. The level documented must be sufficient to allow for further decomposition within the Project Plan. For example, the requirement for training may be identified within the Project Charter. Decomposition within the Project Plan will document the types of training to be delivered, procurement or development of course materials, and so on. Project objectives within the Project Charter projects are executed to meet the strategic goals of an agency or multiple agencies. Objectives are communicated in the Project Charter to ensure that all stakeholders understand the organization's needs that the project addresses.

Project Authority within the Project Charter

Because of a project's complexity, many difficult decisions must be made to keep it on track. For this reason the Project Charter defines the authority and mechanisms to resolve potential problems. Three areas must be addressed. First, the agency's senior management must issue the Project Charter. A level of management is required that can provide organizational resources to the project and have control over the elements that affect it. Second, the Project Charter must establish a project manager who is given authority to plan, execute, and control the project. Finally, the Project Charter must establish a relationship between the project and senior management to ensure that a support mechanism exists to resolve issues outside the authority of the project manager.

In this way, the Project Charter becomes a contract between senior management and the project manager; both have duties and obligations to the project. The Project Charter should have a signature page, which all appropriate parties should sign.

Project Roles and Responsibilities within the Project Charter

The roles and responsibilities for initiating, planning, executing, controlling, and closing out a project are divided among many individuals of the project team. These roles and responsibilities are a result of various contributing factors:

- The size and nature of the organization
- The size and nature of the project
- The number of projects already underway
- The capabilities of the project team members, and
- The maturity of the project management function within the organization.

Allocating roles and responsibilities for various phases, tasks, and activities of a project is essential to ensuring that work is done on time. From this perspective then, it becomes necessary to unambiguously identify work required, to clearly identify dependencies, to accurately estimate durations, to clearly define quality standards, to succinctly describe deliverables, and to develop measurable performance criteria for tasks.

Project Charter

Another manner to detail roles and responsibilities on a project would be to develop a responsibility matrix. In essence, a responsibility matrix lays out the major activities in the project. This matrix can help avoid communication breakdowns between individuals, departments, and organizations because everyone involved can see clearly who to contact for each activity.

A responsibility matrix can be as simple as a spreadsheet, or as intricately drawn from a graphics software application. The matrix can be pasted to a text document for inclusion as part of the project documentation. Figure 2.7 is an example of a Responsibility Matrix.

Major Milestones	Mngt Srvcs Dir	DMB CIO	OPM	VTS Dir	IT Srvcs Dir	VTS Fnc / Ops	PM	IT Rep ITSD / VTS	Prchsng
Project Charter	A	I		E	I	E	E	E	
Project Plan	I		I	A			E	I	
Define As-Is Processes				E		E	E	I	
Define System Requirements	I	I		A	I		E	E/C	I
Review Vendor Capability	I			C		E	E	I	
ITB Process	I	I	I	E		E	E/C	E/C	A
Development Planning	I			A		E/C	E/C	E/C	C
User Test Cycle	I			A		E/C	E/C	E/C	C
Production/Training	I			A		E/C	E/C	E/C	C
Maintenance	I			A		E/C	E/C	E/C	C

Legend:
E = responsible for execution (may be shared)
A = final approval for authority
C = must be consulted
I = must be informed

Figure 2.7
Responsibility Matrix Example

Management Checkpoints and the Project Charter

To ensure that the project progresses satisfactorily, management checkpoints or milestones should be clearly defined with planned dates to measure progress. Checkpoints are high-level milestones. Senior management uses them to approve the completion of a phase or milestone and as go/no-go decision points to proceed with the project. The checkpoints ensure that the products and services delivered meet the project objectives in the time frame established by senior management in the Project Charter.

Project Charter

Project Charter Template Description

The State of Michigan Project Charter template can be seen on the following pages and separately in Appendix B of this methodology. The Project Charter is the major output from the Initiation Phase of the methodology. There are eight major sections of the Project Charter:

- General Information
- Project Purpose
- Project Objective
- Project Scope
- Project Authority
- Roles and Responsibilities
- Management Checkpoints
- Signatures

After establishing the Project Charter, the project team begins the process of devising and maintaining a workable scheme to accomplish the business needs that the project was undertaken to address. The integration of techniques, tools, and skills to map the project course are defined and reviewed in the next Project Management Methodology section, Project Planning Phase.

Management of the Project Charter

Because the Project Charter is an announcement, and because its purpose is to formally announce the project, it is not meant to manage changes that occur. The charter is intended as a one-time document; therefore, if a change occurs that is significant enough to outdate the charter's original purpose and scope then a new charter should be issued.

Project Charter Template

State of Michigan
(Insert Agency Name Here)
Project Charter

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Project Purpose

This section communicates the purpose of the project and the charter that is being established.

C. Project Objective

This section defines the objectives of the project as they relate to the goals and objectives of the organization. Note: Projects are full of uncertainty. As such, it is advisable, as part of this charter, to develop an initial risk assessment to identify, quantify, and establish mitigation responses to high level risk events that could adversely affect the outcome of the project.

The Project will support the following organization strategic goals. For each goal, project objectives are identified. The project plan developed as a result of this project charter will:

- *Develop a project performance measurement plan to measure performance against these objectives.*
- *Provide a project performance report to document the results.*

The external oversight committee must approve the project performance measurement plan.

Agency Goals	Project Objectives

D. Project Scope

The level of detail in this section must be sufficient to allow for detailed scope development in the Project Plan. A more detailed description of the project scope will be developed in the Planning Phase. The reader is cautioned that scope creep (adding work without corresponding updates to cost, schedule, and quality) may render original plans unachievable. Therefore, initial clarification of scope, and adherence to the plan throughout the project, are of the utmost importance. Describe any applicable assumptions and/or constraints that may affect the project.

E. Project Authority

This section describes the authority of the individual or organization initiating the project, limitations or initial checkpoint of the authorization, management oversight over the project, and the authority of the Project Manager. This project charter defines two management structures—internal and external—to ensure change and issues affecting project completion are properly controlled.

- ***Authorization***

This section ensures that the project initiator has the authority to commit the appropriate resources within the organization.

This Project Charter has been initiated by Initiating Organization and authorizes the expenditure of Organization resources to complete a first checkpoint for the Project.

- ***Project Manager***

This section explicitly names the project manager and may define his or her role and responsibility over the project. This section also lists the project manager's skill sets and justifies his or her selection for this project. Depending on the [Project] complexities, this section may describe how the project manager will control matrix organizations and employees.

Identify the Project Manager, their expressed authority, their skill set, and justification for why they were selected to lead the project.

- ***Oversight (Steering) Committee***

This section describes agency management control over the project. Within the project, internal control should be established to control the day-to-day activities of the project. The project manager should manage internal control. External oversight should be established to ensure that the organization's resources are applied to meet the project and organization's objectives.

List Oversight Committee members and contact information.

- ***Controls***

This section should describe or reference a process by which internal and external controls interact. Diagrams should be used where appropriate.

F. Roles and Responsibilities

This section discusses the overall structure of the project organization and its roles and responsibilities throughout the project phases. Note: As an addendum to this sub-section, it may be advisable to develop a responsibility matrix. The matrix lays out the major activities in the project and the key stakeholder groups. It also provides a good example of showing cross-functional/organizational interaction.

- **Project Organization Overview**

This section describes key organizations or individuals supporting the project not directly under the authority of the project manager. A responsibility matrix may facilitate the task of organizing and assigning resource responsibility.

Project Charter Template

Major Milestones	Functional Roles								

Legend:

E = responsible for execution (may be shared)
A = final approval for authority
C = must be consulted
I = must be informed

G. Management Checkpoints

This section describes key management checkpoints established by the initiating agency.

Checkpoint	Evaluation Criteria

H. Signatures

The signatures of the people below relay an understanding in the purpose and content of this document by those signing it. By signing this document you agree to this as the formal Charter statement to begin work on the project described within, and commitment of the necessary resources.

Name/Title	Signature	Date

Moving On To The Planning Phase

Moving on to the Planning Phase

If all goes well, the Project Charter will be accepted and signed, and the project will receive funding and move into the Planning Phase. It is at this time that the project manager for the remainder of the project should be selected.

Project managers who are selected to lead a project but who were not involved in the Initiation Phase (for whatever reason) should be reminded that it is critical to review the Project Initiation Phase documentation. These documents are the agreed-upon foundation for which the project was created and the catalyst for the creation of the Project Plan.

Information Technology Components for Project Initiation

Information Technology Project Initiation

Like all other projects, information technology projects must have a starting point. Once a need has been recognized for a new IT product or service, several processes must take place for the project to be defined more clearly and approved. Within the Systems Development Life Cycle, a Feasibility Study Document will be completed. The creation of this document interrelates with the project manager's responsibilities of putting together a product description, synthesizing a business analysis, and drafting a Project Concept Document and a Project Charter. The table below illustrates a comparison of some of the System Life Cycle Development Initiation Phase and Project Management Initiation Phase efforts at a high level.

	System Development Life Cycle Efforts	**Project Management Efforts**
Initiation Phase	**Support** • Establishment of – Goals & Objectives – Possible Approach – Resource Needs – Other **Deliverables** • Feasibility Study	**Support** • Product Description Statement • Project Feasibility **Deliverables** • Project Feasibility Document • Project Concept Document • Project Charter

The SDLC support processes and documents are understandably more technical in nature and will, for the most part, be the responsibility of a technical staff who are better equipped to discern the technical impact and feasibility of taking on a proposed IT project. In contrast, the project management deliverables will be more involved with the management of the effort as well as the business impact of the project on the agency. This includes the business management processes that will be put into effect to support the IT project if it is carried out.

Information Technology Product Description

In order to provide an accurate understanding of what the proposed project will be expected to provide in the way of a deliverable, the project manager will want to develop a Product Description Statement within the Project Concept Document. A synopsis of the development of a Product Description Statement can be found in the Project Initiation Overview subsection. The information required to create a document such as the Information Technology Feasibility Study on the SDLC side of the project may be transferable to the project's Product Description Statement. Although the information between the project phases and IT life cycles is transferable in some cases, this does not mean that development of documents or creation of support information on one side will take the place of efforts on the other. It is still important to treat each effort as a separate entity and create them separately.

Remember that the Product Description Statement is much less formal and detailed than the feasibility study. This is important to note because the feasibility study is a formal deliverable, while the Product Description is a notational outline of the product characteristics contained within the Project Concept Document.

Information Technology Components for Project Initiation

Information Technology Project Feasibility

A Project Feasibility Document, which is covered in the Project Initiation Overview subsection, is a support mechanism for the Project Concept Document. It is a project management development tool that provides an indication of how the proposed IT project will fit into the business plans of the agency. It will also be used to describe how, within the agency, the product might affect the business plan. Careful consideration should be given to this effort because it will provide an assertion of how the project might be received and used by the customers. The analysis may also draw from input to technical or strategic assessments that are initiated in the SDLC. Understanding the relationship between technology projects and the impact they will have on the business that the agency does is the primary focus of the project feasibility document. The information that is brought together here will be used to support the Project Concept Document from a business needs and strategy perspective.

Information Technology Concept Document

The Project Concept Document is the most important document deliverable created at project inception. The document formally relays the objectives, goals, characteristics, and other components of a project. Information technology projects often have very definitive objectives, goals, and characteristics because of the limited technology options or the specificity with which technology may be applied in certain business situations. The Project Concept Document should contain what is known about the IT project and what needs to be achieved for successful implementation. Being the conceptual document that it is, the Project Concept Document will not hold all of the answers to all of the questions about the project being considered, but it should provide enough information, both technically and objectively, to make a decision to issue a Project Charter.

The Project Concept Document template is provided in Appendix B, and it offers an example of how some sections of the Project Concept Document might be filled out for use with an IT project.

Information Technology Project Charter

The Project Charter for an IT project will be very similar to that of a non-IT project. Most of the data contained within the Project Charter outlines the administrative roles and responsibilities that are a part of all projects. For IT projects, this could be of even greater significance because technology issues may bring together several people who have similar roles within their functional or organizational areas. Setting a baseline for project responsibility early in the project will prove to be beneficial for the project manager many times over later in the project.

A more detailed description of the Project Charter and its role in the Project Initiation Phase process can be found in the Project Charter subsection within the Project Initiation Phase. A template of the Project Charter itself is available in Appendix B.

Project Manager Skills and Responsibilities

As with any other project, the person who manages the Initiation Phase of a project may not always be the same person who is assigned as the project manager during the remainder of the project. The reason for this is that the information technology project manager is required to be a versatile and focused professional.

Information Technology Components for Project Initiation

Needed Skills

Ensuring that the technology experts are doing a thorough job analyzing the feasibility of the project, while simultaneously collecting other necessary project information for the Project Concept Document, is not an easy task. At this stage in the project, it is uncommon for anyone outside of the project manager responsible for project initiation to be exclusively dedicated to the project. Therefore, it may be difficult to find resources to do the preliminary conceptualization and analysis may be difficult. At this stage, the project manager's position may require the skills of a salesman accompanied by the art of persuasion to elicit an interest in a project. Often, the project manager has a short time in which to do this, because interest and support in a project can die just as quickly as it is conceived if no one in the agency pays sufficient attention.

Responsibilities

A clear understanding of what must occur in the Initiation Phase is important to project initiation success. A project manager will need to give attention to the following tasks:

- Make sure that the proper documentation deliverables (Project Feasibility Document, Project Concept Document, Project Charter) are completed in a timely manner. Set reasonable schedule and review dates. Be sure that all people involved with the Project Initiation Phase are aware of the dates and their responsibilities. (See the Project Overview section for additional clarification.)
- Give consideration to, and even begin some preliminary discussion about, what resources will be needed if and when the project progresses to the Planning Phase.
- Be prepared to defend the need for and benefits of the project. (All projects, especially IT projects, come under fire from people or organizations that would like to see them fail.)
- Begin eliciting upper level management support—someone who will champion the effort at the upper level of the agency, if necessary.

PROJECT MANAGEMENT METHODOLOGY

SECTION 3 -- PLANNING PHASE

Section 3: Project Planning

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Section 3: Project Planning

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Section 3: Project Planning

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Introduction

Introduction	This subsection describes the intent of project planning, the roles and responsibilities involved, and some of the associated terminology.
The Planning Process and the Project Plan	This subsection describes the process of planning and developing the project plan. The plan will provide the framework for the other planning documents as well as the other project phases.
Project Objectives and Scope	This subsection discusses the need within an agency to understand the objective of the product/process being created and where this new project fits into the agency objectives. The creation of the project objectives and scope documents are described.
Work Breakdown Structure	This subsection describes in some detail the need for a Work Breakdown Structure (WBS) and how to go about creating one.
Organizational Breakdown Structure	This subsection describes the Organizational Breakdown Structure (OBS) and its impact on the agency and provides a graphical comparison to the WBS.
Activity Definition and Sequencing	This subsection describes the further breakdown of the WBS including detailed explanations of tasks, the different types of tasks, putting tasks in the correct order, and their control systems (charts).
Cost-Benefit Analysis	This subsection discusses the reasons for performing a cost-benefit analysis and describes the high-level steps of performing one.
Resource Planning	This subsection discusses the need to assign project roles, details information on the selection of a project manager (PM) and the project manager's responsibilities as well as the reporting relationships within the project infrastructure.
Project Schedule Development	This subsection of the methodology describes the process undertaken to develop a project schedule and the associated network diagram.
Risk Planning	This subsection describes the processes and plans that must be a part of good risk planning.
Procurement Planning	This subsection describes what role procurement plays in a project as well as what goes into proper procurement planning.
Quality Planning	This subsection explains how to identify which quality standards are relevant to the project and determine how to satisfy them.

Introduction

Communications Planning	This subsection describes the process for planning communications, including who will need what information, how often, etc.
Configuration Management Planning	This subsection describes high-level configuration management (CM) planning that will be used later in the Control Phase.
Budget Planning	This subsection describes the different types of budgets used in project planning as well as what reserves are and when they should be used.
Planning Throughout the Project	This subsection describes the planning throughout different project phases to allow a better understanding of how they interrelate.
Project Planning Transition Checklist	This subsection describes a helpful checklist for project managers that will make the transition from the Planning Phase to the Execution Phase much easier.
Information Technology Components for Project Planning	This subsection describes some important considerations involved with information technology (IT) projects. Specifically, it allows for the opportunity to develop processes that will make the project effort easier to manage.

Section 3: Project Planning

Overview

The Planning Phase

The Project Planning Phase follows the Project Initiation Phase and is considered to be the most important phase in project management. Time spent up front identifying the proper needs and structure for organizing and managing projects saves countless hours of confusion and rework in the Execution and Control Phases of the project.

Figure 3.1 depicts at what point in the Project Management Phases this section of the methodology will be discussed.

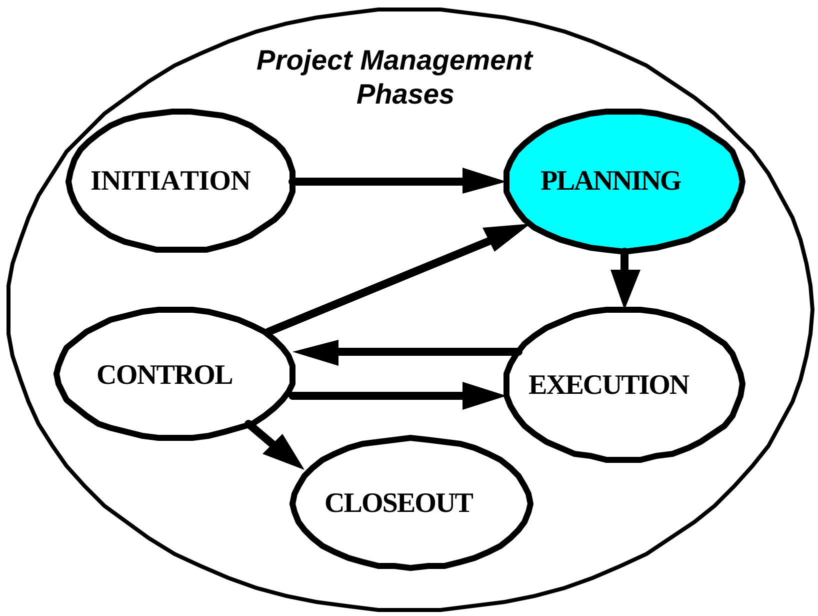

Figure 3.1
Project Management Planning Phase

The purpose of this phase in the project management process is to establish business requirements, establish precise cost and schedule of the project (including a list of deliverables and delivery dates), establish the work organization, and to obtain management approval.

The Intent of Project Planning

Without planning, a project's success will be difficult, if not impossible. Team members will have limited understanding of expectations, activities may not be properly defined, and resource requirements may not be completely understood. Even if the project is finished, the conditions for success may not have been defined. Project planning identifies several specialized areas of concentration for determining the needs for a project. Planning will involve identifying and documenting scope, tasks, schedules, risk, quality, and staffing needs. The identification process should continue until as many of the areas as possible of the chartered project have been addressed.

The Importance of Project Planning

Inadequate and incomplete project planning is the downfall of many high-profile, important projects. An adequate planning process and project plan will ensure that resources and team members will be identified so that the project will be successful.

Overview

Project Planning Roles and Responsibilities

Everyone on the project team and, in most cases, several stakeholders will play a part in the input to planning a project. The responsibilities for project planning are summarized below:

- Project managers are responsible for developing a Project Plan for a specific project. The project manager is responsible for ensuring that the overall planning requirements are fulfilled. This includes delegation of responsibility for specific plan documentation and sign-off for approval at the end of the Planning Phase.

- State agencies are responsible for developing internal procedures to ensure that the planning process is completed consistently with the agency's business plan. All projects must be well thought out, support key stakeholder goals, and include documented processes that allow the project to be tracked and controlled until closure. When the situation calls for it, agency personnel should be involved in Project Plan approval.

- Functional/organizational management is also responsible for ensuring that there are adequate resources assigned to a project. This includes both managerial and product development assignments. A separate management line item is recommended so that management costs are not rolled into overhead costs. Management is a full-time job for most projects – it is not an activity well suited to being performed in small part by many staff members.

- Key stakeholders play an integral part in the planning of a project. They should have representative input and approval in the Project Plan and associated documents before the Project Execution Phase takes place.

Relationships of the planning processes described in this section of the methodology are depicted in Figure 3.2.

Overview

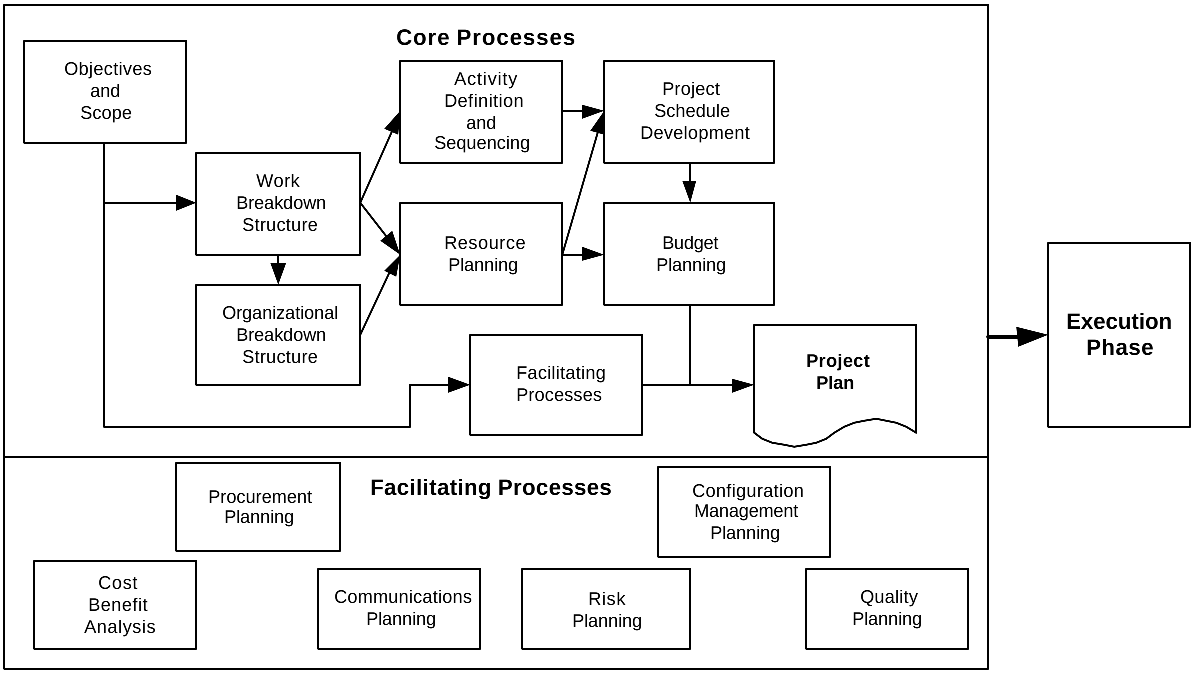

Figure 3.2
Relationships among the Planning Processes

Terminology

As with all the sections of this methodology, a full glossary of terms is provided in Appendix A; however, the following is a subset of terms relative to project planning:

Activity - The work or effort needed to achieve a result. An activity consumes time and usually consumes resources.

Budget - When unqualified, refers to an estimate of funds planned to cover a project for a specified period of future time.

Configuration Management (CM) - The technical and administrative application of configuration control. It includes the maintenance of a configuration control unit, change and version control standards, and configuration of control facilities. Configuration Management is a formal discipline that provides project team members and customers with the methods and tools that are used to identify the product developed, establish baselines, control changes to these baselines, record and track status, and audit the product.

Project Network Diagram - Any schematic display of the logical relationships of project activities. Always drawn from left to right to reflect project chronology. Often incorrectly referred to as a "PERT chart."

Project Plan - A formal, approved document used to guide both project execution and project control. The primary uses of the Project Plan are to document planning assumptions and decisions, to facilitate communication

Overview

among stakeholders, and to document approved scope, cost, and schedule baselines.

Quality - A composite of attributes (including performance features and characteristics) of the product, process, or service required to satisfy the need for which the project is undertaken.

Requirements Document - A formal document that outlines the high-level requirements of a technical project.

Resource - Something that lies ready for use or that can be drawn upon for aid or to take care of a need.

Resource Planning - Determining what resources (people, equipment, materials) are needed in what quantities to perform project activities.

Risk - An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.

Risk Event - A discrete occurrence that may affect the project for better or worse.

Risk Management - The art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interests of its objectives.

Schedule - The planned dates for performing activities and for meeting deliverables.

Stakeholders - Individuals and organizations who are involved in or may be affected by project activities.

Work Breakdown Structure (WBS) - A deliverable-oriented grouping of project elements that organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services.

The Planning Process and the Project Plan

The Planning Process

Project planning is not a single activity or task. It is a process that takes time and attention. Remember that the project is not the product/process deliverable itself, but rather all of the activities, documents, and pieces that go into producing the product or process.

Similarly, the intent of the Project Management Methodology in its entirety is to create a project management process that is repeatable and stable enough for all agencies and their personnel to use. This process includes people with many different backgrounds and from various functional areas. The process is created to ensure the flow of the planning efforts from beginning to end in such a way that all of the necessary areas affecting the project process (or created by it) are considered.

This same idea holds true on individual projects within the agencies. Project planning defines the project activities that will be performed, end products that will be produced, and describes how all these activities will be accomplished. The purpose of project planning is to define each major task, estimate the time and resources required, and provide a framework for management review and control. The project planning activities include defining the following:

- Specific work to be performed and goals that define the project
- Estimates to be documented for planning, tracking, and controlling the project
- Commitments that are planned, documented, and agreed to by affected groups
- Project alternatives, assumptions, and constraints
- Creation of baseline plans from which the project will be managed

The relationships among the planning processes are depicted in Figure 3.3 on the following page.

The Planning Process and the Project Plan

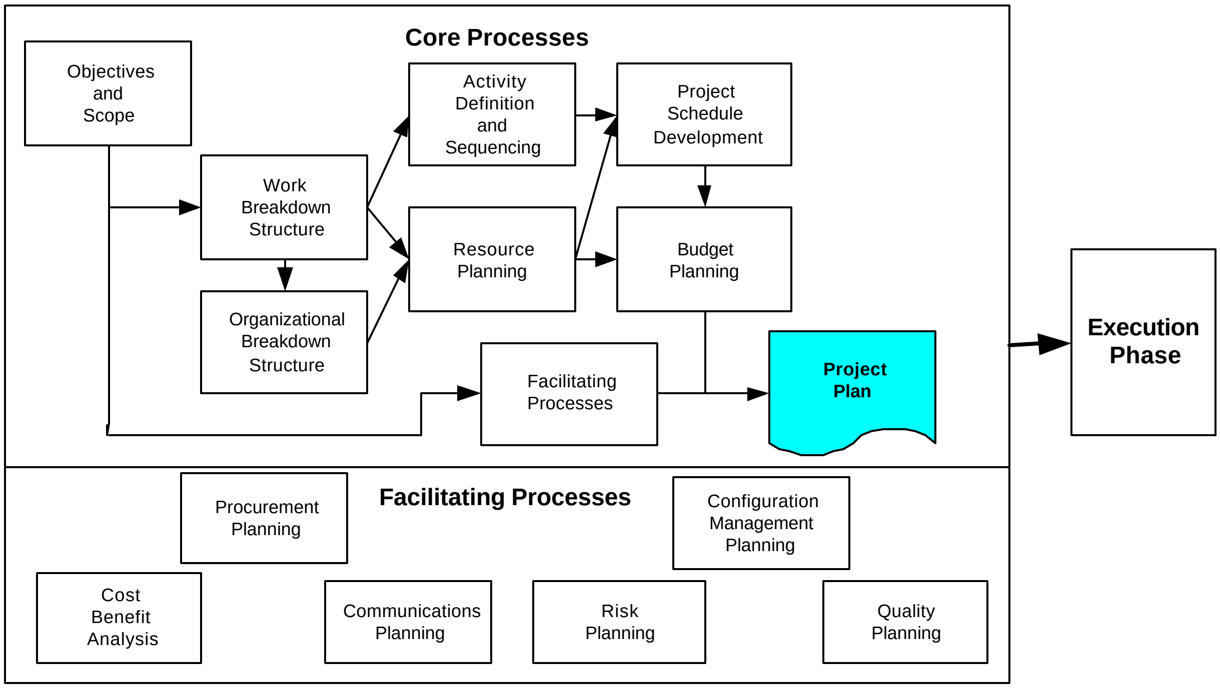

Figure 3.3
Project Plan Identified in the Planning Processes

The planning process includes steps to estimate the size of the project, estimate the technical scope of the project, estimate the resources required to complete the project, produce a schedule, identify and assess risks, and negotiate commitments. Completion of these steps is necessary to establish the Project Plan. Typically, several iterations of the planning process are performed before a plan is actually completed.

Steps in the Planning Process

The planning process consists of the following basic tasks:

- Defining the technical approach used to solve the problem
- Defining and sequencing the tasks to be performed and identifying all deliverables associated with the project
- Defining the dependency relations between tasks
- Estimating the resources required to perform each task
- Scheduling all tasks to be performed
- Defining a budget for performing the tasks
- Defining the functional area(s) used to execute the project
- Estimating each task’s duration
- Identifying the known risks in executing the project
- Defining the process used for ensuring quality
- Defining the process used for specifying and controlling requirements

The Planning Process and the Project Plan

These tasks are described in subsequent sections and each process is defined within the Project Plan Format Template. The Project Plan represents the basic tool for successfully executing a project.

The Project Plan

> *What is a Project Plan?*
> A Project Plan is a formal, approved document used to guide both project execution and project control.
>
> PMBOK®, 2000

The Project Plan forms the basis for all management efforts associated with the project. It is a record of plans that is expected to change over time.

The assigned project manager creates the Project Plan. It should be as accurate and complete as possible without being several volumes in length. The Project Plan documents the pertinent information associated with the project; it should not be a verbose document. It is a document that allows the project manager to manage the details, and not be managed by the details. The Project Plan should cover the following topics at a minimum:

- General Project Information (points of contact, phone numbers, etc.)
- Project Executive Summary
- Project Scope Statement
- Critical Success Factors
- Work Breakdown Structure
- Organizational Breakdown Structure
- Cost-Benefit Analysis
- Resource Plan
- Project Schedule
- Risk Plan
- Procurement Plan
- Quality Plan
- Communications Plan
- Configuration Management Plan
- Project Budget Estimate
- Project Planning Transition Checklist

While each of these areas should be discussed within the Project Plan, it is still imperative to develop documents and processes that describe each of these in detail. These are areas discussed in detail in other subsections within the Project Planning section.

The Planning Process and the Project Plan

Format of the Project Plan

A format template for a Project Plan is provided on the following pages and separately in Appendix B.

The template is presented in an abbreviated form. The actual template and particular sections, once filled in with project data, will be longer than they appear in the blank template.

It is suggested that all areas of the Project Planning Phase be reviewed in detail before the actual Project Plan is created. In fact, the review and the subsequent documents/plans created from the review may be summarized within the Project Plan, or in some cases, is attached to the Project Plan. It is imperative, however, that all areas required in the Project Plan be addressed. As mentioned, the Project Plan is a repository of records that summarizes the general processes and plans that highlight the detailed processes within the project management methodology.

The information associated with the Project Plan evolves as the project moves through its various stages and is to be updated as new information develops about the project. This, of course, will require revision to the Project Plan itself. As previously stated, the Project Plan is a dynamic document that is expected to go through many changes during the life of the project.

Once the Project Plan is approved and baselined, the original content of the Project Plan should not be changed. The Project Plan was agreed to by management and was signed. If the scope is to be modified, then the schedule or budget may be revised. These revisions are treated as addendums to the Project Plan.

Project Plan Review

Once the project manager completes the Project Plan, it should be reviewed and approved by agency management. The level and extent to which the plan will be reviewed is based on the size of the project as stated in dollars or period of time. Ultimately, the review process allows for executive management buy-in and approval of the plan. Once the Project Plan is approved and signed, the project manager is given the authority to complete the current project efforts and carry on into the Execution Phase.

Project Plan Template

State of Michigan
(Insert Agency Name Here)
Project Plan

A. General Information

Information in the project summary areas that was drafted during the project concept phase and should be included here. Information includes the project name, original estimates, plan revision numbers, points of contact, etc.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	
Prime Contractor:		***Date Awarded:***	

Please answer the following questions by marking "Yes" or "No" and provide a brief response as appropriate.				
Is this an updated Project Plan? If so, reason for update:			☐ ***Yes***	☐ ***No***
Budget for project by fiscal year and is project funded? If so, for what amount(s) and period(s)				
Budget Amount:	***Fiscal Year:***	***Funded?***	☐ ***Yes***	☐ ***No***
Budget Amount:	***Fiscal Year:***	***Funded?***	☐ ***Yes***	☐ ***No***
Budget Amount:	***Fiscal Year:***	***Funded?***	☐ ***Yes***	☐ ***No***

Agency Points of Contact

This should be the list of individuals that will be involved with the project during the Execution Phase.

Position	Name	Phone	E-mail
Project Manager			
Senior Management Sponsor			
Senior Technical Sponsor			
Procurement Contact			
Project Team Member			
Project Team Member			
Customers:			
Other Stakeholders:			
Other:			

Project Plan Template

Prime Contractor Information
Company Name:

Position	Name	Phone	E-mail
Project Manager			
Senior Technical Sponsor			
Contracts Contact			
Other			

B. Executive Summary

Information in the project summary areas was started during the project concept phase and should be included here. Information includes the project name, original estimates, plan revision numbers, points of contact, etc.

Business Need/Problem

Identify business need/problem that needs to be solved.

Statement of Work

This statement should be short and to the point. It should not contain language or terminology that might not be understood.

Project Objectives

Provide a brief, concise list of what the project is to accomplish.

Project Approach

Describe the strategy to deliver the project. For example, it may describe a phased strategy, contracting approach, reference to implementation, etc. Subsections may be created to present the strategy.

C. Additional Project Requirements

Provides a detailed listing of project requirements, with references, to the Statement of Work, the Work Breakdown Structure, and specifications. This would also include any mechanisms used to assist in the management control over the project. Escalation procedures, cyclical management reporting, and project status reports should also be included.

Project Plan Template

No.	Requirement	SOW Reference	Task Reference	Specification Reference	Date Completed	Comments/ Clarification
1.						
2.						
3.						
4.						
5.						

D. Technical Project Components

Provide a detailed listing of the Requirements Definition, Specifications, Design, and Implementation and Training Plans for inclusion into the project activities.

E. Signatures

The signatures of the people below relay an understanding in the purpose and content of this document by those signing it. By signing this document you agree to this as the formal Project Plan.

Name/Title	*Signature*	*Date*

E. Project Plan Documents Summary

Check the box for each document included in the project plan.

☐ ***PROJECT SCOPE STATEMENT***

Provides a documented description of the project as to its output, approach, and content.

☐ ***CRITICAL SUCCESS FACTORS***

Provides the project team, and management, with project critical success factors (objectives) that all members of the team understand, accept, and are committed to.

Project Plan Template

☐ ***WORK BREAKDOWN STRUCTURE***

Describes a deliverable-oriented grouping of project elements which organize and define the total scope of the project.

☐ ***ORGANIZATIONAL BREAKDOWN STRUCTURE***

Provides an organization chart that defines the communications channels, responsibilities, and the authority of each participating person/unit.

☐ ***COST BENEFIT ANALYSIS***

Provides the project team with information to make a balanced decision about the costs and benefits, or value, of various economic choices.

☐ ***RESOURCE PLAN***

Describes the major resources needed to proceed with the execution of the project.

☐ ***PROJECT SCHEDULE***

Provides the project schedule using a Gantt chart. The schedule must include milestones, task dependencies, task duration, work product delivery dates, quality milestones, configuration management milestones, and action items.

☐ ***RISK PLAN***

Provides a description of all risks identified for the project and a plan to integrate risk management throughout the project.

☐ ***PROCUREMENT PLAN***

Identifies those needs for the project, which can be met by purchasing products or services from outside of the agency.

☐ ***QUALITY PLAN***

Provides a Quality Plan that defines the person(s) responsible for project quality assurance, procedures used and resources required to conduct quality assurance.

☐ ***COMMUNICATIONS PLAN***

Defines the information needs of the project stakeholders and the project team by documenting what, when, and how the information will be distributed.

☐ ***CONFIGURATION MANAGEMENT PLAN***

Provides the project team with a change management methodology for identifying and controlling the functional and physical design characteristics of a deliverable.

☐ ***PROJECT BUDGET ESTIMATE***

Describes cost and budget considerations including an overview, additional resource requirements, and estimated cost at completion.

☐ ***PROJECT PLANNING TRANSITION CHECKLIST***

The Project Planning Transition Checklist ensures that planning activities have been finished, reviewed, and signed off so that the project may move into the Execution Phase.

Project Objectives and Scope

Project Objectives

Project objectives, as described earlier, are those criteria within the project that will determine whether the project is a success or a failure. If the product or process designed does not meet the objectives as laid out by the project stakeholders, then customer satisfaction will be jeopardized. Objectives can be described in two different ways:

- ***Hard Objectives*** - These relate to the time, cost, and operational objectives (scope) of the product or process.
- ***Soft Objectives*** - These relate more to how the objectives are achieved, and which may include attitude, behavior, expectations, and communications.

Remember that objectives should be set at an acceptable level with the intent of delivering product or process that meet the objectives. The objectives should be documented and agreed upon in order to deliver a suitable product. In short, project objectives planning is about defining the acceptable limits and looking for ways to meet them.

The relationship of the project objectives and project scope to the rest of the Planning Phase components is shown in Figure 3.4.

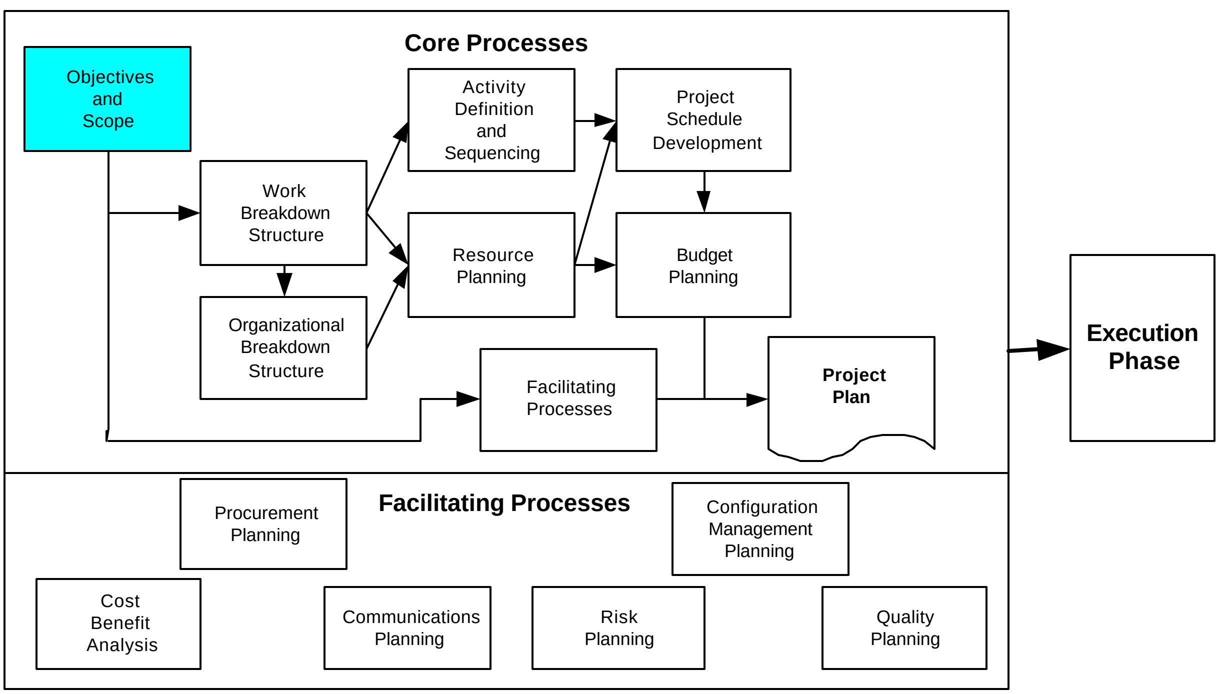

Figure 3.4
Project Objectives and Scope Identified in the Planning Processes

Project Objectives and Scope

Defining Project Scope

There is often confusion in project teams regarding the difference between project objectives and project scope. The term "project scope" refers to the magnitude of the effort to complete a project. Conversely, the term "project objectives" refers to a description of the desired outcome of the project. For example, the objective could be to build a new five-story building on the location of the back parking lot by next December. The scope could be to build the building with a prefabricated metal frame with a cement floor. Consequently, it is imperative that the project objectives and the project scope be clear to everyone to ensure project success.

Project Scope Statement

The development of a written statement, known as the Project Scope Statement, provides the basis for future project decisions. This statement is of singular importance to the project, as was previously stated, because it sets the overall guidelines as to the size of the project. The content of this statement, at a minimum, will include the following:

- ***Project Results/Completion Criteria:*** What will be created in terms of deliverables (and their characteristics) and/or what constitutes a successful phase completion.
- ***The Approach to be Used:*** What type of process or technology will be used, whether the project will be done internally or externally, etc.
- ***Content of the Project:*** What is and is not included in the work to be done.

Inputs to the Scope:

The following documents may be helpful in defining the project scope:

- Project Work Statement
- Project Objectives (including identified constraints and assumptions)
- Project Feasibility Document
- Project Concept Document
- Project Charter

To ensure that the project scope is completed correctly and in its entirety, it is imperative that a Project Scope Statement be completed and signed by the key stakeholders.

Project Scope Management

Project scope management can be just as important to scope planning as the Scope Statement itself. This effort describes how the project scope will be managed and how scope changes will be integrated into the project. It is a simple statement that discusses the likelihood of scope change within the project and how any changes will be identified. The efforts of scope management should integrate well with the Configuration Management Plan created later in the planning process. More formalized processes of scope management are normally used on larger projects in which the likelihood for scope creep or changing requirements is much greater.

Project Scope Statement Template

See Project Scope Statement can be found on the following page, as well as in Appendix B.

Project Scope Statement Template

State of Michigan
(Insert Agency Name Here)
Project Scope Statement

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:	____________	***Date:***	____________
Controlling Agency:	____________	***Modification Date:***	____________
Prepared by:	____________	***Authorized by:***	____________

B. Project Results/Completion Criteria

State what will be created in terms of deliverables (and their characteristics) and/or what constitutes a successful phase completion.

C. The Approach to be Used

State in sufficient detail, what type of approach will be used to manage scope changes. State whether the project be done internally or require "outside" assistance.

D. Content of the Project

Define what work is to be done. Include relevant business requirements.

E. Exclusions

Define what work is not to be done. Include relevant business requirements.

Critical Success Factors

Critical Success Factors

As a part of setting objectives and scope, it is always a good idea to set critical success factors that can determine whether a particular phase of the project will be completed successfully. The deliverables stated within documents such as the Project Scope Statement and the Project Plan can be good indicators for determining if a project is meeting its stated success factors. It is also possible to set baseline dates against critical success factors to ensure that the project is meeting its success criteria.

For instance, a success objective for a particular project might be to have a Project Plan and schedule approved and baselined two weeks after initiation. Beyond that, a project success might be captured by having a working prototype of a product (database) or a beta test group of a process (agency training program) completed by a certain calendar date within the implementation period.

These success objectives need to be clearly stated and there must be a clear understanding within the project team as to why they are relevant to the project. The objectives should be aggressive and challenging and may be difficult to achieve at times. However, they will be the benchmark for which your project success will be set. Furthermore, they should coincide and be consistent with overall project scope and schedules.

Success objectives do not necessarily need to be formally documented and incorporated into the Project Plan, but should be a motivator for reaching success milestones.

Critical Success Factors Template

The Critical Success Factors Template can be found on the following page, as well as in Appendix B.

Critical Success Factors Template

State of Michigan
(Insert Agency Name Here)
Critical Success Factors

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Critical Success Factors

Describe what will be the determining factors that are needed to ensure project success.

C. Responsible Team Members

Describe who, in addition to the Project Manager, is responsible for seeing that these objectives are met and why.

D. Planned Delivery Date or Phase

Relay when the project product will be delivered by date or phase as accurately as possible.

E. Actual Delivery Date or Phase

Updated later in the project. Relay when the project product was actually delivered.

F. Impact

Describe what impact the success factors will have on the success of the project if they are not achieved by the planned date.

G. Comments

Any other comments regarding the project success.

Work Breakdown Structure

Work Breakdown Structure Definition

The Work Breakdown Structure (WBS) component of the Planning Phase provides the capability to break the scope into manageable activities, assign responsibility to deliver the project scope, and establish methods to structure the project scope into a form that improves visibility for management. The WBS also requires that the scope of the overall project be documented.

The relationship of the Work Breakdown Structure to the rest of the Planning Phase components is shown in Figure 3.5.

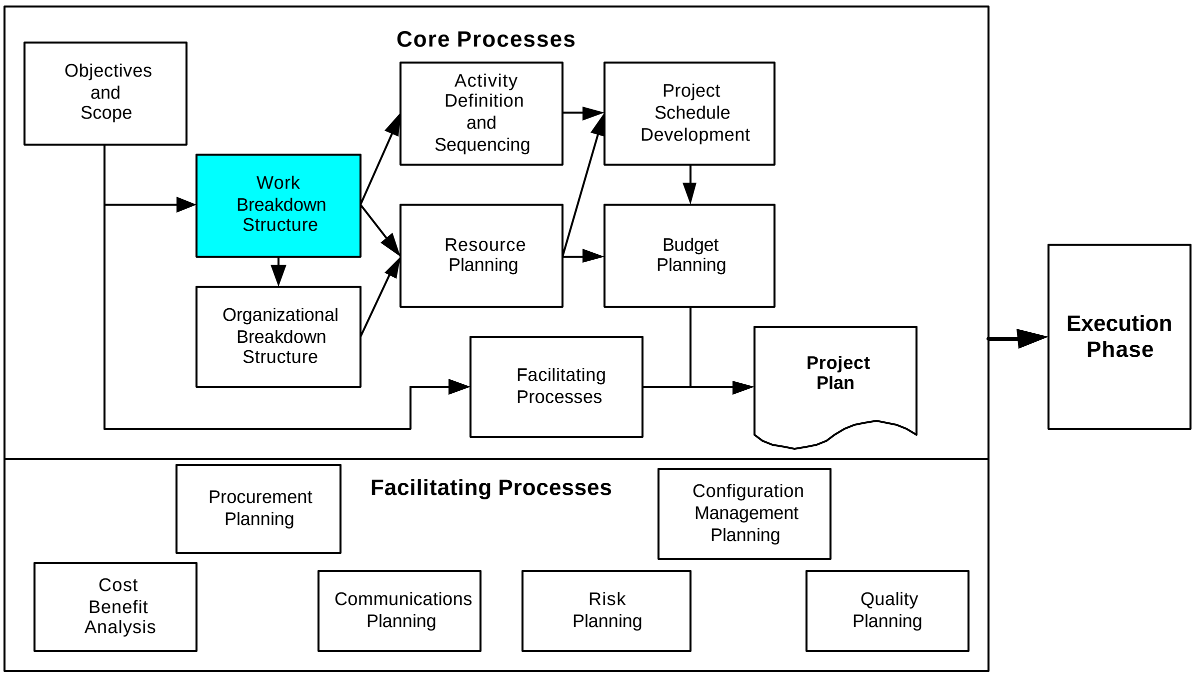

Figure 3.5
Work Breakdown Structure Identified in the Planning Processes

A WBS is a hierarchical representation of the products and services to be delivered on a project. Elements of scope are decomposed to a level that provides a clear understanding of what is to be delivered for purposes of planning, controlling, and managing project scope. In its entirety, a WBS represents the total scope of a project. A WBS is neither a schedule nor an organizational representation of the project; instead, it is a definition of what is to be delivered. Once the scope is clearly understood, the project manager must determine who will deliver it and how it will be delivered. This is the one planning tool that must be used to ensure project success on any size project.

Work Breakdown Structure Development

Figure 3.6, on the following page, depicts the process to develop a Work Breakdown Structure.

Work Breakdown Structure

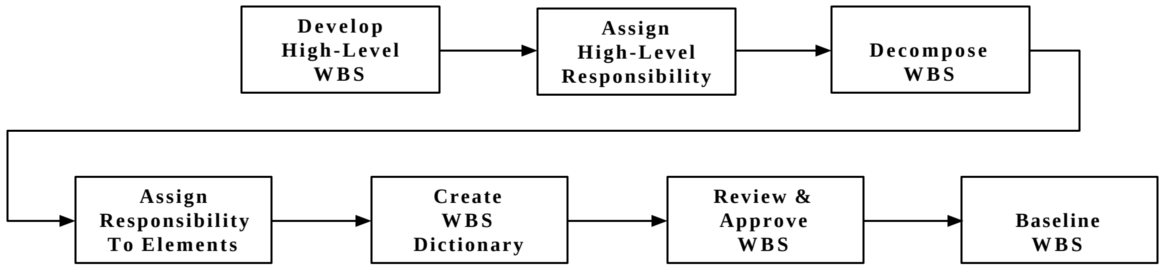

Figure 3.6
WBS Development Process

Develop High-Level WBS
Typically, the project charter provides the overall scope of the project and is used as the basis to define high-level WBS elements of project scope. The high-level WBS can be quickly defined by using predefined templates.

Assign High-Level Responsibility
Once the high-level elements of the WBS are defined and the organization is established to deliver the project, the agency entities responsible to deliver the overall elements of scope are assigned responsibility for the high-level WBS elements. This will ensure a management focus to decompose the high-level elements into discrete products and services and thus complete the task of defining the entire scope of the project.

Decompose WBS
The WBS is decomposed into discrete products and services to be delivered during the project. Higher level elements represent groupings of products and services to be delivered. Decomposition identifies discrete products and services. Elements are decomposed in the following way:

- A discrete product or service is identified
- Responsibility to deliver the product or service is assigned to one individual or functional area
- Scope is clearly understood
- Cost is reasonably estimated
- The element is manageable
- Higher risk or more critical elements are decomposed to a lower level

Assign Responsibility to Elements
After the WBS is decomposed to the lowest level, responsibility is assigned to all elements. Assignment at the higher level ensures that management is responsible for the entire project scope. Individuals assigned to the lower level elements are responsible for planning, controlling, and delivering the product. For more information on this topic, refer to the Resource Planning subsection.

Create WBS Dictionary
Once defined, an element's scope is described. This description is often referred to as a "Work Breakdown Structure Dictionary". The purpose of the work breakdown structure dictionary is to clearly describe what scope is to be delivered within each element so that the functional area responsible for

Work Breakdown Structure

delivery can accept it, plan it, and manage the delivery. The WBS Dictionary is often created during activity definition (refer to the "Activity Definition and Sequencing" subsection).

The work breakdown structure dictionary also provides boundaries and hand-offs between functional areas responsible for delivery. The WBS Dictionary is often a separate document that the WBS references.

Review and Approve WBS

Senior management within the project reviews and approves the WBS and its supporting dictionary. Those personnel who are assigned responsibility should accept the responsibility to deliver the scope of each element. This step is essential in assuring management commitment to the project.

Baseline WBS

Once defined and accepted by the responsible functional areas, the WBS is baselined and put under change control. This means that the work effort of project team members is consistent with the scope defined in the WBS. Changes to scope are controlled through a defined process, and the WBS provides a vehicle to capture, assess, review, and implement change.

Work Breakdown Structure Format

The WBS is simple in its intent but can be elaborate in its presentation. The WBS may be a simple bulletized list of activities or detailed spreadsheet list of tasks and subtasks, depending on the size of the project. Regardless of its size, however, the importance of the WBS cannot be overstated. Work breakdown structures come in several formats. An example of a WBS is provided at the end of this subsection. A graphical representation (organization chart) can be seen in Figure 3.7 on the next page.

Work Breakdown Structure

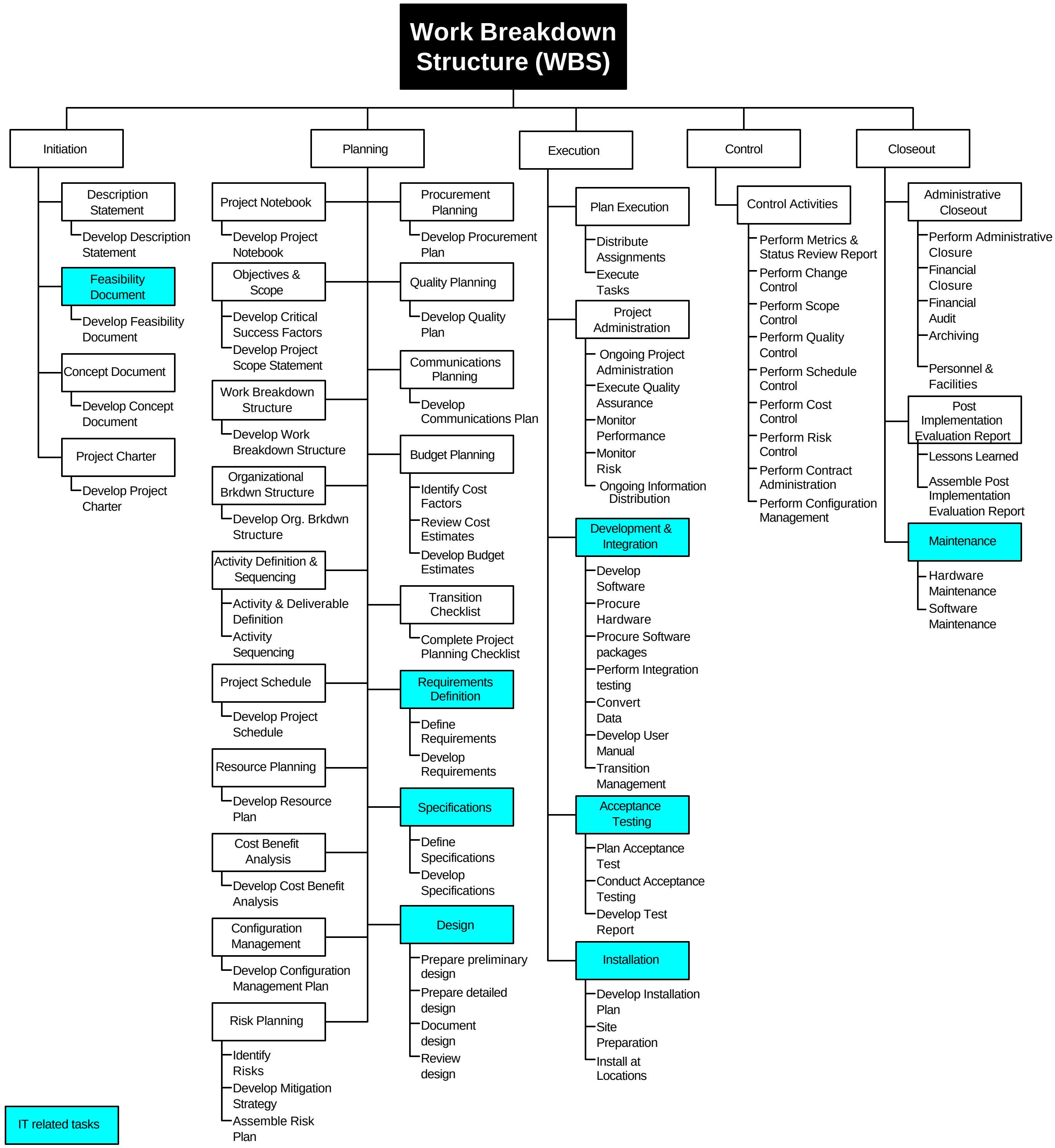

Figure 3.7
A Typical Software Development WBS

Work Breakdown Structure

Helpful Hints for Developing the Work Breakdown Structure

Templates
All projects are unique; however, many projects are similar at a high level. Agencies that implement similar projects should develop templates to assist in the planning process. A WBS template, a generic definition of project scope, provides an excellent starting point to tailor the specifics of a unique project. Templates should be at a relatively high level and in an automated format to allow for ease of use.

Because of the many types of projects that may exist in a single agency, different templates should be created. If tailoring a template requires extensive work, create your own WBS. It may be useful as a template for a later project.

Work breakdown structure templates provide the following:

- A generic structure for elements understood throughout the agency, allowing for consistent communication
- The ability to ensure that the entire scope for a project is defined by starting with a template that breaks down WBS elements typically found in similar projects
- A reduction in the amount of time spent developing a WBS

The following diagram, Figure 3.8, shows how WBS templates are used.

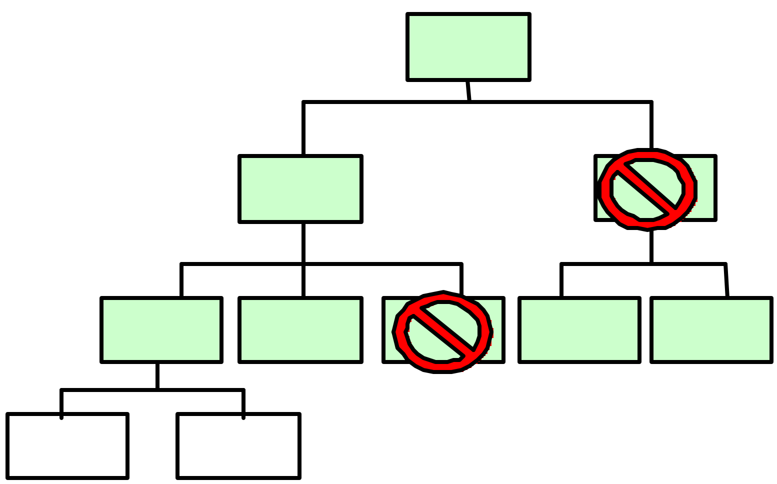

Figure 3.8
Work Breakdown Structure Usage

In the example above, the lined circles represent generic template elements that are not part of this particular project and should be deleted along with any associated “children” (subelements to the element in question). The boxes that are not shaded represent the breakdown of elements that are unique to the project and have been added to the template.

Review Inputs
To ensure that the entire scope is defined and the WBS is structured to improve visibility to management, all information available describing the

Work Breakdown Structure

project should be reviewed. The review should be conducted before developing the WBS to ensure that the scope of the project and the management strategy in which to implement it are understood. Translating scope and strategy properly into the WBS is the most important step in developing a WBS. Typical inputs to WBS development are described in the Project Initiation Phase in Section 2 of this methodology.

Management Approach

Each agency has a unique approach to managing projects. Approaches may affect the way products and services are delivered and how they are managed and controlled. The WBS should be designed to complement the project's management approach. As an example, a software development project may entail a release strategy that provides different functionality of the software in two releases. The agency may use a structured waterfall development approach that entails creating a requirements document, a design document, and a source code. The resulting WBS may capture the strategy and the way it is controlled as shown in Figure 3.9.

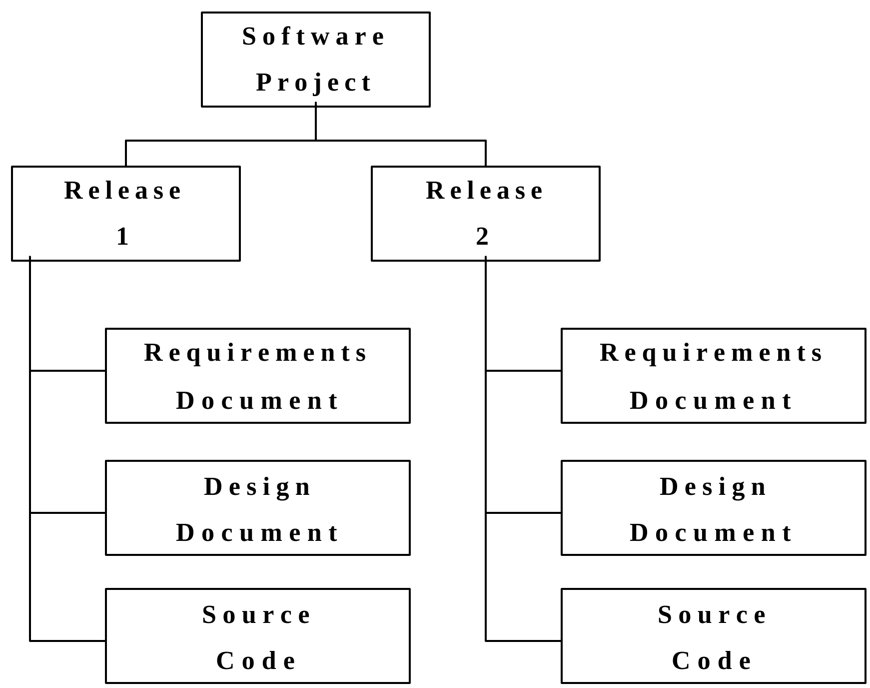

Figure 3.9
Work Breakdown Structure Strategy

If the approach included only one requirements document independent of the release, the WBS would change to eliminate two documents, one under each phase, and have a third second-level item to capture one single document.

Product and Service Orientation

The best way to view the purpose of a WBS is to understand that it focuses on *what* products and services are being delivered for the project. If management focuses attention on the individual components being delivered, the project will, in all likelihood, be delivered. If, on the other hand, management focuses on *how* the components are being delivered, they may not be able to see the forest for the trees.

Schedules focus on *how* a product or service is delivered. By design, schedules focus on activities and actions characterized by a verb-noun format. Products and services are not verbs. Therefore, verbs do not belong in a WBS. Once verbs are introduced into the WBS, there may be a tendency to focus on how the project is being delivered instead of what is being delivered.

Not an Organization Chart

The WBS describes products and services to be delivered on a project. At the higher levels, similar products and services are grouped together to improve communication. For example, software at the highest level may represent software development *and* software procurement; at the lower levels, the distinction between development and procurement is made. Software procurement and development would probably be the responsibility of different functional areas at the lower levels. Therefore, it can be understood that the WBS is not an organizational breakdown, even though functional areas are assigned responsibility to deliver a product or service.

In many cases, because of the grouping of similar products and services, some functional areas may be responsible for all or most of a particular WBS leg. Because of automation, reporting a WBS in an organizational display is not difficult; therefore, it should not be organizationally based. Again, a WBS is product- and service-based.

Management Concurrence

Usually the project manager and technical representatives of the project develop the WBS. Executive management is typically the prime recipient of WBS benefits. Therefore, all levels up to the project manager should understand the WBS including structure, scope, and use in reporting. Management must concur with, own, and use the WBS as a tool to manage the project. Without management ownership of the WBS, scope and its delivery can be less than optimal.

Work Breakdown Structure Dictionary

The work breakdown structure dictionary describes in detail the scope of each element of WBS. The description includes what is to be delivered, attributes of the product or services, and, in some cases, what is not included within the element. Defining what is not included ensures that the responsible individual does not allow additional scope to be added. The work breakdown structure dictionary removes ambiguity. It can be used to communicate scope to contractors or subcontractors, in many cases forming the basis for a statement of work.

Simplicity

Defining the scope of a project can be difficult (even for simple projects). As a tool for management focus, WBS size is important. If it is too large, it can be a management burden. Many WBS's have been made more complex than the project itself. A WBS should be created and elements broken down based on the amount of risk associated with the element of scope.

For example, in most cases, procuring desktop personal computers (PCs) is not high in risk. Therefore the element of scope can easily be left at the level of desktop PCs. The administrative deliverables, such as requirements specifications for each workstation, the purchase order to procure the PCs, the receiving document, and the installation checkout form, although deliverables, should not be identified in the WBS (although it should possibly be in the work breakdown structure dictionary) as separate elements.

Hardware procurement is not normally high in risk. Developed software *is* high in risk and should be defined further due to the increased risk. Developed software may be further broken down to identify a requirements specification document, a design document, and a source code. A balance needs to be struck between defining the entire scope properly and creating a complex WBS that is too large to be useful to management.

<u>Coding Scheme</u>

Many projects are complex and require automated tools to assist in managing and reporting project information. A WBS, because of its hierarchical nature, requires that a parent-child (hierarchical) relationship be established and captured for automated reporting through the structure. To achieve the parent-child relationship, a coding scheme may be developed and assigned to elements. The simpler the coding scheme the better. The codes should not be assigned until the WBS is somewhat stable, requiring very few edits. This approach eliminates the use of complex schemes and the need to reassign codes because of changes in the WBS.

As shown in the simplified coding scheme example below, a WBS is also a family tree of related deliverables that make up an entire project.

Project XYZ Work Breakdown Structure

1.0	CMS Project
1.1	Project Management
1.2	Communications
1.3	Documentation
1.4	Hardware
1.5	Software
1.6	Systems Engineering
1.7	Facilities
1.8	Training

The WBS becomes the common basis for defining all of a project's major deliverable components. It is also the basis for deriving the costs and benefits for the alternatives considered. The level of detail depends on the complexity of the project and how much definition is needed to derive accurate and complete costs and benefits. The lowest level within a WBS is the work package of activities needed to complete a deliverable. The sum of the cost to complete the activities in a work package is the cost of the deliverable, and the sum of all the deliverables is the total cost of the project.

<u>Automation</u>

Because the WBS represents the entire project scope and is coded using a

Work Breakdown Structure

hierarchical structure, automated databases and project management tools can enhance its ability to assist management in understanding project status. Using a database and the WBS code as a unique identifier, the entire WBS can be associated to most project management information elements.

Using desktop, client-server, and web-based reporting tools, the WBS can portray all aspects of project delivery. The WBS should be placed in an environment where tools can be used to manage the resulting project information.

Work Breakdown Structure and Project Reporting
Because the WBS defines all products and services to be delivered and structures those attributes in a way meaningful to management, it should be used as the basis to report project status to management. Figure 3.10 provides a functional view of the types of project attributes that can be related to and reported against WBS elements.

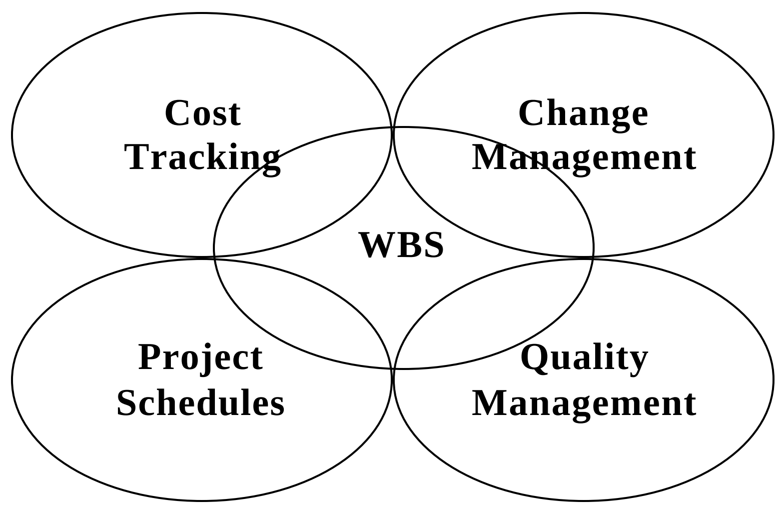

Figure 3.10
Work Breakdown Structure Attributes

As stated earlier, if management is controlling the products and services to be delivered, the project will be delivered. If the elements that affect delivery are reported against the products and services, management control can be enhanced.

All attributes above require an association to the WBS element. Cost-tracking systems are normally part of an agency's management information system and can be accessed to obtain cost data against each WBS element. Although financial systems may not be geared to track cost elements against a WBS, some negotiation can be made to obtain the desired information so it can be used (another reason to keep the WBS simple). Project schedules, quality, and change management systems are typically used on projects and have the inherent capability to report project information against a variety of customer-defined elements, including the WBS.

Work Breakdown Structure

Other reporting relationships exist; this is only an example. The basic premise of this scenario is that it allows management to view those elements affecting project delivery. The WBS provides the mechanism to do so.

Rollup
Reporting cost, schedule, quality, and change information to management via the WBS entails rolling up status information. It is termed "rollup" because the information is aggregated.

As an example, a schedule exists to deliver each product in the WBS (services may not always have a schedule). The schedule identifies the tasks to deliver the product. This is a many-to-one relationship (many tasks deliver one product). The schedule status information reported to management should be aggregated to the WBS element to display the planned (baseline) start and finish and the current start and finish for the WBS element. In this way, management can review the product's delivery status against the baseline. If a problem exists, management can understand why and take corrective action.

Work Breakdown Structure – Table Format Development

There are certain pieces of information needed to describe the WBS deliverable and then document it in a table format:

- ***Work Breakdown Structure Element or Number***. From the WBS the agency has built (e.g., 1.5).
- ***Work Breakdown Structure Task Name***. From the WBS the agency has built (e.g., software).
- ***Task Effort / Duration***. From the WBS the agency has built (e.g., 65 hours of effort).
- ***Resource Name***. The individual who is responsible for the execution of this specific task.
- ***Element or Dictionary Description***. The definition, in simple terms, of the element and what it is intended to do for the project.
- ***Cost***. The total cost for the WBS element.

Other Elements of the Work Breakdown Structure Table Format
As will be described in the Cost-Benefit Analysis subsection, the WBS is the foundation for deriving costs for each of the work packages (elements) of the project. Accordingly, the WBS table format can be expanded to include various columns that annotate costs associated with each element. These elements would include such things as element cost, cost derivations, methodologies used in estimating costs, and element costs of project duration (i.e., how costs are spread over time).

For a table format (spreadsheet) representation of the WBS, see the following pages. A Work Breakdown Structure Template can also be found in Appendix B.

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
1	**INITIATION**				
1.1	Project Description Statement			Describe the characteristics of the product/process to be created.	
1.1.1	Develop Project Description Statement		Project Manager, Business Analyst		
1.1.2	Project Description Statement Completed		Project Manager	Milestone	
1.2	Project Feasibility			Identify project constraints, alternatives, and related assumptions to analyze and discuss project feasibility.	
1.2.1	Develop Project Feasibility Document		Project Manager, Budget Analyst, Business Analyst		
1.2.2	Project Feasibility Document Approved		Project Manager	Milestone	
1.3	Project Concept			Define project's reason for being initiated and compare to ensuring consistentcy with Agency's business plan throughout the identification of critical success factors, the product description statement, and other high planning information.	
1.3.1	Prepare Project Concept Document		Project Manager, Budget Analyst, Business Analyst		
1.3.2	Project Concept Document Completed		Project Manager	Milestone	
1.4	Project Charter			Identify the name and purpose of the project. Also establish the statement of support from the issuer (management).	
1.4.1	Prepare Project Charter Document		Project Manager, Executive Manager, Business Analyst		
1.4.2	Project Charter Approved		Project Manager, Executive Manager	Milestone	
2	**PLANNING**				
2.1	Develop Project Notebook/Document Management System		Project Manager	Develop a repository for all the project plans	
2.2	Objectives and Scope			Define the need within the agency to understand the objective of the product/process being created.	
2.2.1	Develop Critical Success Factors		Project Manager, Executive Manager, Business Analyst, Technology Owner		

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
2.2.2	Develop Project Scope Statement		Project Manager, Executive Manager, External Resource, Functional Manager	Prepare baseline plan.	
2.2.3	Project Scope Statement Completed		Project Manager	Milestone	
2.3	Work Breakdown Structure			Create the structure that is a deliverable-oriented document that will be used to break down the work to be done within the project to a manageable level.	
2.3.1	Develop Work Breakdown Structure		Project Manager, Business Analyst, Technology Owner	Prepare baseline plan.	
2.3.2	Work Breakdown Structure Completed		Project Manager	Milestone	
2.4	Organizational Breakdown Structure			Create a hierarchical, project organizational structure that will serve to assist in defining the responsibility attributes of the project.	
2.4.1	Develop Organizational Breakdown Structure		Project Manager, Functional Manager		
2.4.2	Organizational Breakdown Structure Completed		Project Manager	Milestone	
2.5	Activity Definition and Sequencing			Develop the tasks that involve dividing the project into smaller, more manageable components and then specify the order of completion.	
2.5.1	Activity and Deliverable Definition		Project Manager, Business Analyst, Technology Owner		
2.5.2	Activity Sequencing		Project Manager, Business Analyst, Technology Owner		
2.5.3	Activities Defined and Sequenced		Project Manager	Milestone	
2.6	Project Schedule Development			Develop a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task durations, and deadlines.	
2.6.1	Develop Project Schedule		Project Manager, Functional Manager	Prepare baseline plan.	
2.6.2	Project Schedule Completed		Project Manager	Milestone	
2.7	Resource Planning			Identify and describe all the major resources needed to proceed with the execution of the project.	

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
2.7.1	Develop Resource Plan		Project Manager, Functional Manager, External Resource		
2.7.2	Resource Plan Completed		Project Manager	Milestone	
2.8	Cost Benefit Analysis			Develop and provide the project team with information to make a balanced decision about the costs and benefits, or value, of various economic choices on proposed project activities/tasks.	
2.8.1	Develop Cost Benefit Analyses		Project Manager, Budget Analyst, Business Analyst, Technology Owner		
2.8.2	Cost Benefit Analyses Completed		Project Manager	Milestone	
2.9	Configuration Management			Develop a change management methodology for identifying and controlling the functional and physical design characteristics of a deliverable.	
2.9.1	Develop Configuration Management Plan		Project Manager, Configuration Management	Develop Project library	
2.9.2	Configuration Management Plan Completed		Project Manager	Milestone	
2.10	Risk Planning			Describe all risks identified for the project and a plan to integrate risk mitigation throughout the project.	
2.10.1	Identify Risks		Project Manager, Executive Manager, External Resource, Business Area Rep., QA_SME		
2.10.2	Develop Mitigation Strategy		Project Manager, Executive Manager, External Resource, Business Area Rep., QA_SME		
2.10.3	Assemble Risk Plan		Project Manager, Administration, QA_SME		
2.10.4	Risk Plan Completed			Milestone	
2.11	Procurement Planning			Identify needs for the project, which can be best met by purchasing products or services from outside of the agency.	
2.11.1	Develop Procurement Plan		Project Manager, Business Analyst, External Resource		
2.11.2	Procurement Plan Completed		Project Manager	Milestone	

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
2.12	Quality Planning			Develop a Quality Plan that defines the person(s) responsible for project quality assurance, the standards and procedures to be used, and resources required to conduct quality-related activities on the project.	
2.12.1	Develop Quality Plan		Project Manager, QA-SME		
2.12.2	Quality Plan Completed		Functional Manager	Milestone	
2.13	Communications Planning			Define the information needs of the project stakeholders and the project team, by documenting what, when, and how the information will be distributed.	
2.13.1	Develop Communications Plan		Project Manager, Executive Manager, Business Analyst, Administration		
2.13.2	Communications Plan Completed		Functional Manager	Milestone	
2.14	Budget Planning			Determine the costs of associated with the defined activities.	
2.14.1	Identify Cost Factors		Project Manager, Budget Analyst, Administration		
2.14.2	Review Cost Estimates		Project Manager, Functional Manager, Budget Analyst		
2.14.3	Develop Budget Estimates		Project Manager, Budget Analyst, Business Analyst		
2.14.4	Project Budget Estimate Completed			Milestone	
2.15	Project Planning Transition Checklist			Create and review a transition checklist that ensures planning activities have been finished, reviewed, and signed off so that the project may move into the execution phase.	
2.15.1	Complete Project Planning Transition Checklist		Project Manager, Executive Manager		
2.15.2	Project Plan Approved		Project Manager, Executive Manager	Milestone	
2.16	Requirements Definition				
2.17	Specifications				
2.18	Design				
2.18.1	Prepare Preliminary Design		Development Coordinator	Establish design model	
2.18.1.1	Develop Enterprise Architecture				
2.18.1.2	Prepare Data Flow Diagrams				
2.18.1.3	Prepare Logical Data Model				
2.18.2	Prepare Detailed Design		Development Coordinator	Detail design model	

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
2.18.2.1	Prepare Physical Data Model				
2.18.2.2	Prepare Data Dictionary				
2.18.3	Document Design		Development Coordinator	Record design model	
2.18.3.1	Develop Design Specification				
2.18.4	Review Design		Project Manager, Development Coordinator	Evaluate design model	
2.18.5	Approve Designs			Milestone	
3	EXECUTION				
3.1	Project Plan Execution			Execute the tasks that lead to the completion of a deliverable.	
3.1.1	Execution Tasks Go Here		Project Team	Prepare status reports and collect/analyze project metrics.	
3.1.2	Project Execution Complete			Milestone	
3.2	Project Administration			Monitor the project in terms of comparing to the plans developed in the Planning Phase	
3.2.1	Ongoing Project Administration		Project Manager, Executive Manager, Administration, External Resource		
3.2.2	Execute Quality Assurance Plan		Quality Assurance		
3.2.3	Ongoing Performance Monitoring		Project Manager		
3.2.4	Ongoing Risk Monitoring		Project Manager		
3.2.5	Ongoing Information Distribution		Project Manager, Administration		
3.3	Development/Integration				
3.3.1	Develop Software		Senior Programmer	Outline software	
3.3.1.1	Develop server Application				
3.3.1.2	Develop User Interface				
3.3.1.3	Develop XYZ Interface				
3.3.2	Procure Hardware		Project Manager, Procurement	Design hardware	
3.3.2.1	Procure Server				
3.3.2.2	Procure Workstations				
3.3.3	Procure Software Packages		Project Manager, Procurement	Detail software package	
3.3.3.1	Procure Databases				
3.3.3.2	Procure User Interface Building Tool				
3.3.3.3	Procure Operating System				
3.3.4	Perform Integration Testing		Senior Programmer	Create/execute test plan	
3.3.5	Convert Data		Senior Programmer	Convert information	
3.3.5.1	Develop Conversion Plan				
3.3.6	Develop User Manual		Publications	Develop work manual	

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
3.3.7	Transition Management		Project Manager, Development Coordinator		
3.4	Acceptance Testing				
3.4.1	Plan Acceptance Test		Development Coordinator	Design acceptance plan	
3.4.2	Conduct Acceptance Test		Development Coordinator	Conduct test	
3.4.3	Develop Test Report		Development Coordinator	Create test report	
3.5	Installation				
3.5.1	Develop Installation Plan		Development Coordinator	Create installation plan	
3.5.2	Site Preparation		Development Coordinator	Prepare delivery site	
3.5.3	Install at Locations		Development Coordinator	Install system at site(s)	
3.5.3.1	Headquarters				
3.5.3.2	Site One				
4	**CONTROL**				
4.1	Project Control Activities			Ensure changes are documented, plans are updated, and the project team is informed.	
4.1.1	Perform Metrics and Status Report Review		Project Manager		
4.1.2	Perform Change Control		Project Manager, Configuration Management		
4.1.3	Perform Scope Control		Project Manager, Configuration Management		
4.1.4	Perform Quality Control		Project Manager	Conduct audits and reviews.	
4.1.5	Perform Schedule Control		Project Manager		
4.1.6	Perform Cost Control		Project Manager		
4.1.7	Perform Risk Control		Project Manager		
4.1.8	Perform Contract Administration		Project Manager		
4.1.9	Perform Configuration Management		CM Manager	Manage Change Board and maintain configuration items.	
5	**CLOSEOUT**				
5.1	Administrative Closure			Prepare closure documentation of the project deliverables for the customer, and prepare for other administrative actions to ensure that the project and its assets are redistributed.	
5.1.1	Perform Administrative Closure		Project Manager, Administration		
5.1.2	Financial Closure		Functional Manager, Budget Analyst		

Sample Work Breakdown Structure – Table Format

Shaded areas are IT related tasks

WBS	Task Name	Effort / Duration	Resource Names	WBS Dictionary	Cost
5.1.3	Financial Audit		Project Manager, Budget Analyst		
5.1.4	Archiving		Project Manager, Administration		
5.1.5	Release Personnel and Facilities		Project Manager, Functional Manager		
5.2	Post Implementation Evaluation Report			Document successes and failures of the project, and record all selected, pertinent metrics that influenced planned and actual budget and scheduled activities. Also document recommendations for other projects of a similar size and nature.	
5.2.1	Lessons Learned		Project Manager, Budget Analyst, Business Analyst, IT Analyst, Business Area Rep., Executive Manager, Team Manager, Quality Assurance, Technology Owner		
5.2.2	Assemble Post Implementation Evaluation Report		Project Manager		
5.2.3	Project Sign-off		Project Manager, Administration, Budget Analyst, Business Analyst, IT Analyst, Business Area Rep., Configuration Management, Executive Management, Team Manager, Technology Owner	Milestone	
5.2.4	Recognition		Project Team		
5.3	Maintenance				
5.3.1	Hardware Maintenance		Senior Programmer	Conduct maintenance	
5.3.2	Software Maintenance		Senior Programmer		

Organizational Breakdown Structure

Organizational Breakdown Structure Definition

An Organizational Breakdown Structure (OBS) represents the project organizational structure arranged and coded in a hierarchical format to improve communication throughout a project. The OBS assists in reporting project attributes that are the responsibility of an agency. The hierarchical nature of the OBS provides the ability to aggregate project information to higher levels until the top level is reached. The OBS is usually used with a WBS to ensure that all elements (scope) of a project are assigned to a responsible organization and controlled.

The relationship of the organizational breakdown structure to the rest of the Planning Phase components is shown in Figure 3.11.

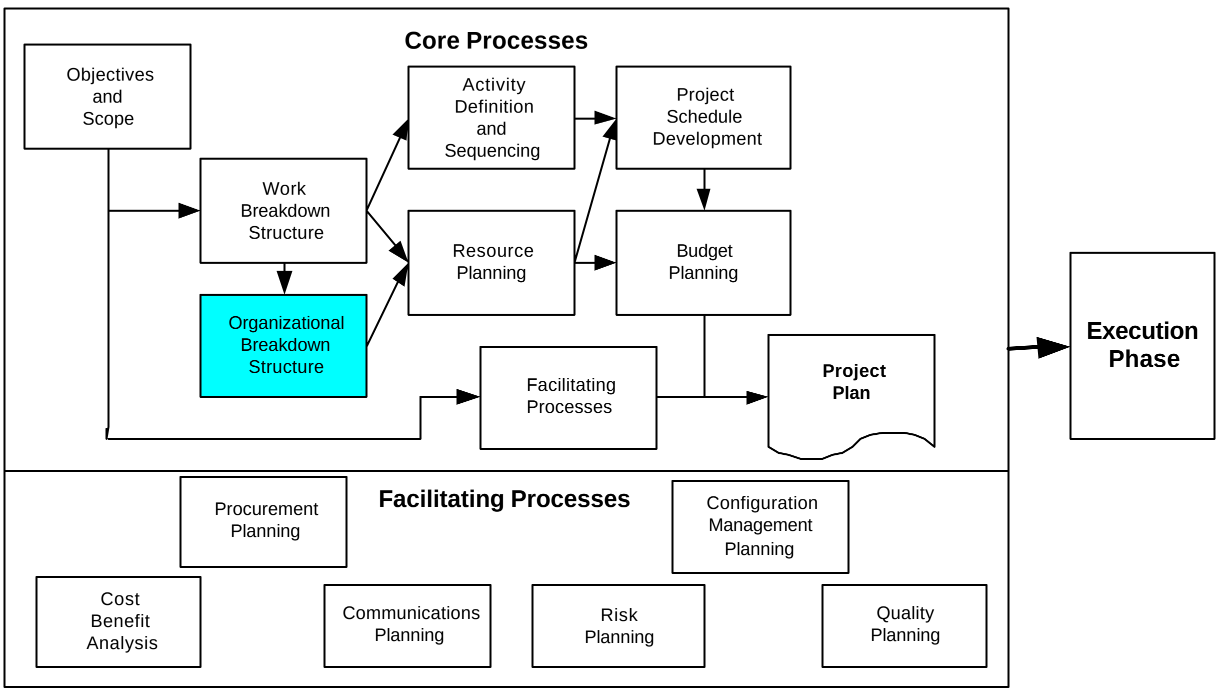

Figure 3.11
Organizational Breakdown Structure Identified in the Planning Processes

Organizational Impact on the Organizational Breakdown Structure

Because the purpose of the Organizational Breakdown Structure (OBS) is to assist in communicating project attributes (for example, cost, schedule, technical, and scope attributes) to specific functional areas or individuals supporting project delivery, the type of organization structure chosen is independent of the need for an OBS.

Organizational Breakdown Structure Example

The OBS should be coded in a hierarchical (parent-child) manner so aggregation from lower organizational elements to successively higher ones can be achieved. Project information can then be related to the OBS so that information can be understood functionally. The parent-child relationship allows for information to be aggregated to the parent until the highest level

Organizational Breakdown Structure

element summarizes the information of its children. The OBS can then be used to roll up a variety of management information, such as scope, cost, schedule, risk, issues, and so on. Figure 3.12 is an example of budget information contained within a WBS and displayed functionally.

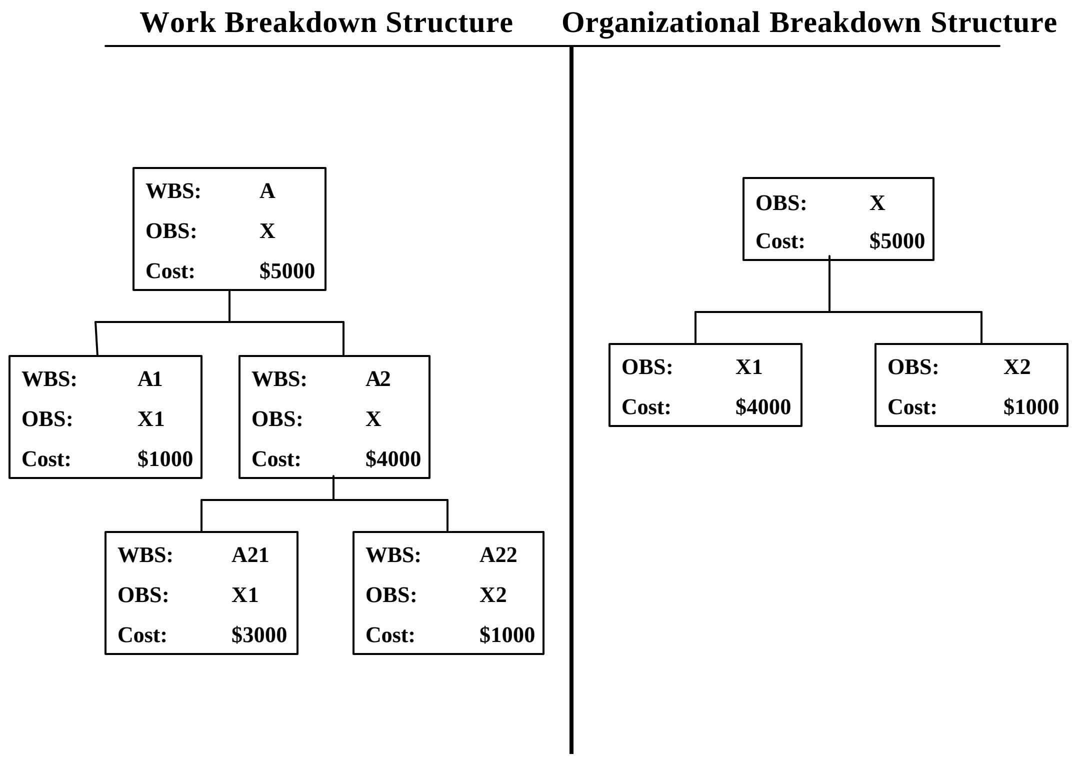

Figure 3.12
Work/Organizational Breakdown Structure Budget Comparison

The WBS, on the left, displays a breakdown of scope with budget information and OBS information related to each of the lowest level elements (WBS element "A2" is an intermediate level). Budget is associated with A1, A21, and A22. The WBS/OBS relationship allows the aggregation of budget information to the organization. The OBS, on the right, represents the organization delivering the project. Note that the highest levels of the WBS and OBS are equal, as all scope, and thus cost, is assigned to an organizational entity. In this example, the OBS communicates scope and budget information to the respective managers of X1 and X2 organizations so they can manage the cost associated with delivering the A1, A21, and A22 products or services.

Steps in Creating the Organizational Breakdown Structure

Creating the OBS is a rather straightforward development process. Again, the OBS is the tool that is used to show which work elements in the WBS are assigned to which organizational units. As such, the steps in creating the OBS are as follows:

- Create a blank "tree" type diagram that looks similar to the WBS in order to assign responsibility for work packages. A spreadsheet-type diagram

Organizational Breakdown Structure

(see the WBS subsection), with all the elements of the WBS listed, including work definitions, would be a suggested format for the less experienced project team member.

- Confirm that the work package to be assigned has been approved and that there is adequate definition explaining the function that needs to be carried out.
- Assign resources according to the number of resources, the type of resources, the duration of each resource specified, and that time in the project that the resources will be required. Consider the level of involvement of each resource (e.g., some resources are needed to do the work, some resources are needed for inspection, some resources are needed for approval, and some may be needed for review).

When completed, the OBS will be the tool that provides a means for all project team members to view their responsibilities and agree upon their assignments.

Activity Definition and Sequencing

Activity Definition and Sequencing

One of the most important parts of the project planning process is the definition of activities that will be undertaken as part of the project. Activity sequencing involves dividing the project into smaller, more manageable components (activities) and then specifying the order of completion. Much of this has already been done within the process of creating the WBS. No matter how the WBS has been broken down, by the time the project manager gets to the activity level, the activities should be the same. To view examples of a WBS, refer to the WBS subsection within this section of the methodology.

The relationship of activity definition and sequencing to the rest of the Planning Phase components is shown in Figure 3.13.

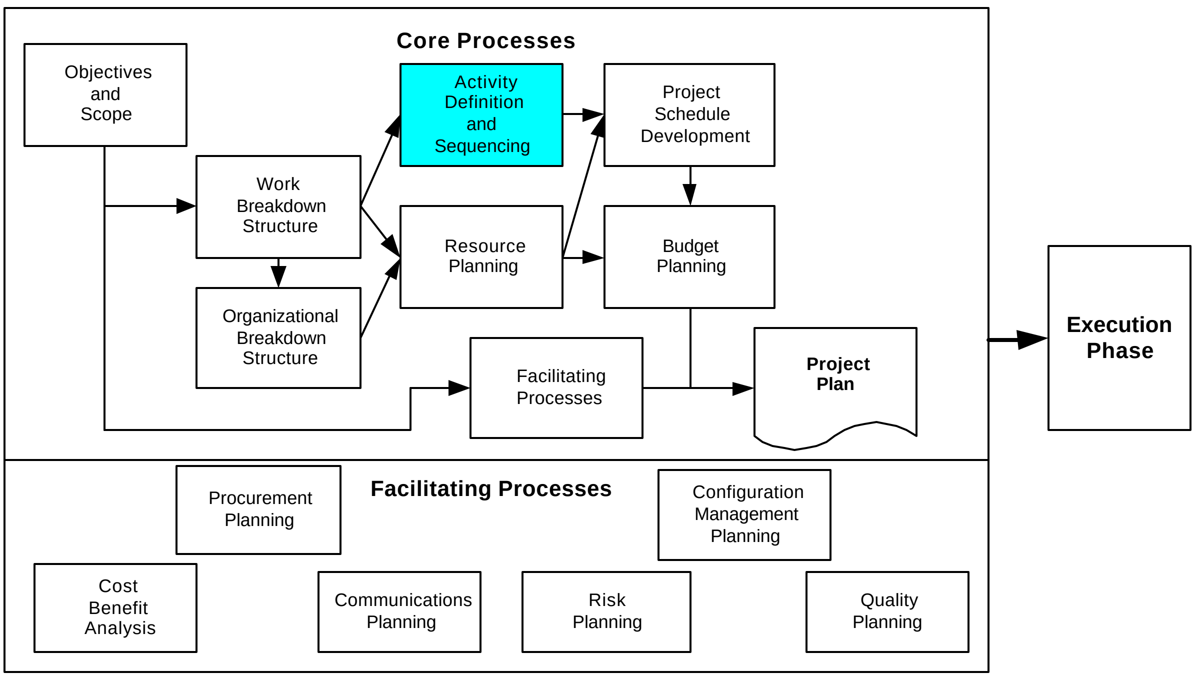

Figure 3.13
Activity Definition and Sequencing Identified in the Planning Processes

The WBS reflects activities associated with overall project management, requirements, design, implementation, transition management, testing, training, installation, and maintenance. The project manager is responsible for defining all top-level tasks associated with a project and then further decomposing them as planning continues.

Defining Project Tasks

WBS tasks are developed by determining what tasks need to be done to accomplish the project objective. The choice of WBS is subjective and reflects the preferences and judgment of the project manager. As levels of the WBS become lower, the scope, complexity, and cost of each subtask become smaller and more accurate. The lowest-level tasks, or work packages, are independent, manageable units that are planned, budgeted, scheduled, and controlled individually.

Activity Definition and Sequencing

As efforts of similar scope and type are planned, the basic WBS tasks remain fairly similar, but each project requires a specific set of tasks that address the uniqueness of the project's requirements. Certain top-level elements, such as project management, are included in the WBS of every project, regardless of its type, size, or complexity. Other items, like installation, may not apply to every project.

There is no simple formula to define how detailed a work breakdown needs to be. There are, however, some helpful guidelines for completion:

- Break down the work until accurate estimates of cost and resources needed to perform the task are provided.
- Ensure that clearly defined starting and ending events are identified for the task. These may be the production of a deliverable or the occurrence of an event.
- Verify that the lowest level tasks can be performed within a reasonable period of time—length of activities should be approximately in the range of 2% of the length of the project (e.g., a one-year project will have task durations between a day and a week). Each project must define “reasonable.” If the time period to complete a task is too long, an accurate project status in the Execution Phase may not be possible. An industry standard rule of thumb is to make work packages that can be completed within time frames of two weeks (80 effort hours).
- Verify that people assigned to the project are all assigned a WBS task. Have a firm rule**:** If the task is not on the WBS, it is not performed.

The initially developed WBS evolves over the course of the Planning Phase. It is probable that the WBS will look quite different as the scheduling, estimation, and resource allocation portions of the plan are completed. Generally, if a WBS element does not start with a verb, it hasn't been broken down (decomposed) enough.

The WBS has multiple uses. It is both a task list for the Planning Phase and a structure for providing report status during the Execution Phase. As individual low-level tasks are completed, the project progress is assessed. The WBS also serves as a useful management communication tool by which results can be compared with expectations.

Defining Task Relationships

The WBS denotes a hierarchy of task relationships. Subtask completion eventually rolls up into task completion, which ultimately results in project completion. There can, however, also be relationships between tasks that are not within the outlined hierarchy (perhaps from other projects). These relationships need to be noted, and the ultimate structuring of the tasks optimized to favor a minimum of horizontal dependencies and relationships. If the tasks are not organized efficiently, it becomes difficult to schedule and allocate resources to the tasks.

Defining Deliverables

Deliverables associated with each task are shown in the WBS and are reflected in the Project Scope Statement section of the Project Plan. A sample of a deliverables template is shown in the following table. All deliverables are listed as they are identified. As the schedule is completed, the due date is filled in and responsibility for the deliverable is assigned as it

Activity Definition and Sequencing

is known (typically when the organization chart is defined). The date delivered is a field that is filled in as deliveries are made.

Over the course of the project, a comparison of the due date and the date delivered provides a metric for how well deliverable dates are met by the project team.

Product Name	Due Date	Date Delivered	Author/ POC
Requirement Specification	4/1/2002	4/30/2002	G. Brown
Design Specification	8/1/2002		G. Brown
Test Plan	8/1/2002		A. Jones
Implementation Plan	11/1/2002		B. White
Source Code	12/1/2002		L. Brass
Test Report	1/30/2002		A. Jones

While the deliverables list is a compilation of information identified in the WBS and the project schedule, it is useful to maintain a separate list because deliverable completion can be a key metric of project progress. Separate tracking of deliverables can help keep a project on track. It also serves as a useful communication tool with both stakeholders and the project team.

For more information on activity/task sequencing, refer to the "Project Schedule Development" subsection.

Cost Benefit Analysis

Cost-Benefit Analysis Defined

A Cost-Benefit Analysis (CBA) provides the information to make a balanced decision about the cost and benefits, or value, of various economic choices (for example, an information technology investment). It is a methodology for management to use when decisions need to be made among competing alternatives. It enables the agency to quantify the activities of the existing and alternative processes.

When the agency conducts a CBA, it is defining its objectives and alternatives in terms of costs and benefits. It is also defining important assumptions, factors, and judgments to build the cost and benefits used in comparing alternatives. The final product is a consistent document that enables the agency to understand what things cost and what benefits are associated with various alternatives. A CBA provides the basis for making sound business decisions. It can also be used as the basis to justify decisions, as a baseline to measure progress against stated goals, and as a guide to understanding the impact of proposed changes.

The relationship of the cost-benefit analysis to the rest of the Planning Phase components is shown in Figure 3.14.

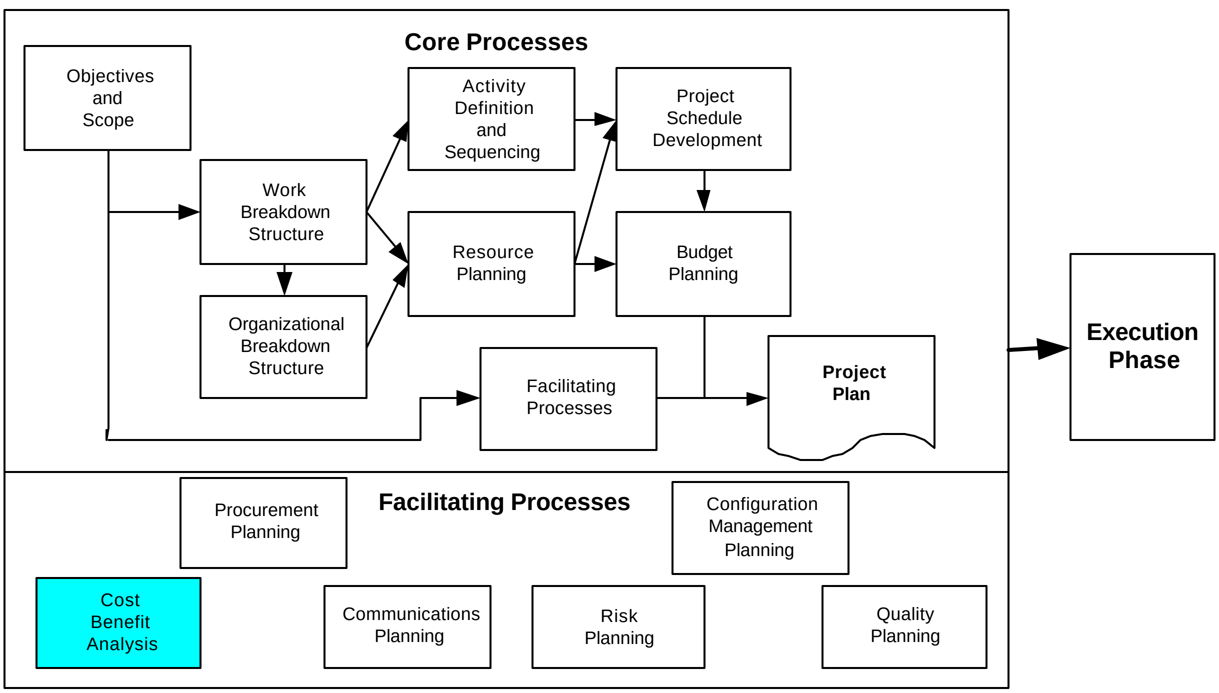

Figure 3.14
Cost-Benefit Analysis Identified in the Planning Processes

Intent of a Cost-Benefit Analysis

A cost-benefit analysis provides a method for making choices among alternatives based on their costs and benefits. When a senior executive must choose between two or more options, the CBA will provide straightforward, quantitative information that can be easily and quickly used to support decisions.

Cost Benefit Analysis

Getting Started

The underlying foundation for analyzing the costs and benefits of proposed solutions includes the following sequence:

1. Define the project, objectives, alternatives, assumptions, ground rules, and the elements to be costed
2. Research the cost elements, analyze them, collect the appropriate data, decide on an estimating methodology, and then cost them all
3. Identify the principal functional and technical cost drivers and their sensitivity to changes in assumptions
4. Analyze risk items and perform sensitivity analysis, including collecting total lifecycle costs and benefits
5. Analyze the relative merit of alternatives
6. Present the results

Keep the approach flexible and tailorable so that the effort and results are consistent with the size and complexity of the alternatives being evaluated, the lifecycle phase, and the level and type of review being supported.

The following is an outline of the general steps needed to complete a CBA. The Agency can use the results to choose among alternatives and then track progress against defined goals.

Format and Content

It is always helpful to know, in general, how the final product and its content should look. This knowledge will help the agency organize work as it progresses. A CBA template is available later in this subsection and in Appendix B. The template presents a general outline that helps organize information so that the analysis can be used effectively to support the decision process. The amount of detail and information included in a CBA depends on the size and complexity of the individual project.

The template shown is for a larger project; however, even smaller projects should cover the same subjects in a more consolidated way. For very small projects, a short white paper or a few slides will suffice to cover the relevant information. Do not spend more time and money on the analysis than the program is worth. It should be a tool to help organize information so that economical decisions can be made. In addition to the information shown in the template, typical appendices to a CBA might include the following:

- Detailed cost estimates for individual alternatives, including the basis for estimating each work breakdown structure element
- A WBS outline and a dictionary that defines what is in each cost element
- Detailed schedules that can later be used to manage the project
- Specific references and guidance documents supporting the project
- Data sources and references to support the estimating methodology
- A glossary that defines abbreviations and terms used in the analysis

No matter how the information is organized, the document should stand on its own and accurately support agency recommendations.

Cost-Benefit Analysis Steps

The general steps for performing a CBA are listed below. Using this approach as a framework for developing a CBA will help the agency evaluate its status quo / alternative (as-is/to-be) processes, define the

Cost Benefit Analysis

objectives more thoroughly, and address the alternatives consistently. Although the general outline should always be followed, the amount of detail used during each step will vary depending on the size and complexity of the individual project.

1. **Define the Project**. This step is the most critical. It forms the foundation for the rest of the effort. It includes identifying the problem to be solved, the objectives of the mission or function, and the alternatives that will satisfy the customer's needs while staying within environmental factors such as assumptions and constraints. It also includes defining the work breakdown structure deliverables to be costed and the assumptions and ground rules for the status quo and alternatives models. The WBS becomes the outline for the rest of the work to be done. The WBS will be updated on a regular basis as the analysis progresses.

2. **Research the Cost Elements**. This step includes researching the cost elements that make up the WBS, collecting appropriate cost-driver data, analyzing and validating the data, deciding on an estimating methodology, and then costing all the elements. The need is to develop future profiles of the current system and the projected profiles of alternative proposed systems.

3. **Identify Cost Drivers**. Once the basic estimating is done, there is a need to identify the principal functional, technical, and schedule cost drivers and their potential sensitivity to changes in assumptions or project decisions in preparation for the next step.

4. **Analyze Risk and Sensitivity**. Once the costs are calculated for each lifecycle phase, they are then aggregated to show total lifecycle costs and benefits. Based on this information, the agency will identify the cost-risk items and perform sensitivity analysis to determine whether changes might alter the original recommendations or simply assess what happens if some sensitive cost element exceeds the current estimate. The sensitivity analysis tests the impact of risk and uncertainty to determine which conditions might change the ranking of alternatives.

5. **Analyze Alternatives**. Next, analyze the relative merit of alternatives against each other, including their sensitivity to specified risks and potential changes. The results should also compare net benefits over time, return on investment (ROI), and show the break-even point for your investment.

6. **Present the Results**. The final step is to put together presentation materials to support your analysis and recommendations. Depending on the size and complexity of the project, this could be as simple as a white paper or briefing, or it could be more formalized.

Detailed instructions on developing each of the above steps are available later in this section.

Summary

Alternative costs should not be the only criteria used to evaluate new or improved processes. Following the steps outlined in this subsection for a CBA will provide the framework for systematically assessing monetary and non-monetary costs and benefits across existing and new processes. It is important to identify and estimate the costs and benefits using a common, comprehensive structure (WBS) so alternatives can be consistently compared and reflect accurate results and conclusions. This process provides a commonsense approach and outlines a sound methodology that will allow achievement of this objective.

The costs for each alternative for the WBS elements required to meet the objectives should be exhaustive. At the same time, the emphasis should always be on the quality of analysis rather than the quantity of analysis. Aim for a concise, clearly written CBA so that reviewers and senior management can easily follow the analysis, understand the key cost drivers, and understand how they affect the analysis. A quality CBA is achieved through a cooperative effort involving CBA and functional personnel. Solid advance planning and definition are essential to completing a timely and useful CBA.

Planning requires early clarification of the tasking and a solid WBS based on a thorough exchange of information. Many of the tasks will be done in conjunction with, or at least overlap, other tasks. Also, many of the activities will go through several iterations as various aspects of the project are better defined.

Figure 3.15 is an example of the cost-benefit analysis format and content.

Cost Benefit Analysis

Sample Cost Benefit Analysis Format and Content

Section 1 Project Overview and Background

- Overview
- Direction
- Program Background and Definition

Section 2 Discussion of Alternatives

- Project Ground Rules and Assumptions
- Current Process (As-Is Model)
- Discussion of Alternative Concepts and Goals
  - Program Concept
  - Functional Concept
  - Technical Concept
- Project Alternatives (To-Be Model)
- Acquisition Strategy
- Discussion of Alternatives
- Schedule

Section 3 Lifecycle Costs and Benefits

- Lifecycle Cost and Benefit Summary
  - Lifecycle Cost Summary
  - Lifecycle Benefit Summary
- Risk and Sensitivity Analysis
  - Risk Analysis
  - Sensitivity Analysis
- Lifecycle Cost Benefit Comparison

Figure 3.15
Sample Cost-Benefit Analysis Format and Content

Step 1: Define the Project

As previously indicated, project definition is the first and most critical step. It is the basis for the rest of the effort. It includes defining the WBS assumptions and ground rules to be used for all alternatives. This information will be continually updated throughout the analysis. It is also the basis for the majority of the information that goes in the various parts of Sections 1 (Project Overview and Background) and 2 (Discussion of Alternatives) of the CBA report. It then serves as the basis for deriving the information in the other sections of the report. Following is an explanation of defining the WBS and the assumptions and ground rules for all alternatives.

Work Breakdown Structure

The proposed alternative should be defined using a WBS. A common WBS (at least at the highest levels) should be built and used for (1) the way business is currently being done (as-is) and (2) the alternatives that result from any business process reengineering or improvement effort (to-be). This method is important so that when the agency compares alternatives, it knows that all the relevant categories of costs and benefits have been included.

Assumptions and Ground Rules

These become the rules that are used to estimate the costs and benefits. They reflect regulatory guidance, directions, environmental conditions, or agency situations that will need to be agreed upon when developing the CBA. Assumptions are generally suppositions needed to develop an estimate. By establishing assumptions and ground rules, reviewers and managers will have a consistent understanding of the basis for the estimate. Further, any one of the assumptions can be varied to see how sensitive the variation is to the assumption.

The CBA should always include a complete list of assumptions and ground rules along with supporting rationale, guidance, and references. The important criteria are that they are reasonable and based on historical data, economic forecasts, or planned changes in processes or operations. The following are examples of general categories:

- ***General and Programmatic***. Information in these areas should reflect approved decisions, budgets, and schedules that will influence how the costs and benefits are calculated. Examples in this area might include legislative direction, laws, actual budgets, approved strategic plans, etc. Programmatic assumptions might include implementation plans, goals and measures, availability of resources, agency policy decisions, etc. It is often difficult to distinguish between these two areas, so it is usually better to address them together. The important thing is to get them written down so reviewers understand the project's content and any constraints on the project, especially those that are externally imposed.

- ***Technical and Functional***. Technical assumptions reflect agreement on representative technical architecture, capability, and support, such as how computers are used and maintained and what the standards are for office software, etc. Functional assumptions reflect the concept of operations for day-to-day work, processes, procedures, and other basic information needed to estimate reasonable costs and benefits.

- ***Cost Estimating***. The ground rules for cost estimating typically include items like a standard work year for a full-time equivalent, wage/salary rates, the discount rate used for present value calculations, catalog pricing, economic life for items being estimated, disposal values, inflation indices, etc.

Step 2: Research and Cost the Cost-Benefit Elements

If there is a reasonable WBS and the basic assumptions and ground rules are identified, then estimating cost can begin. The results will be the basis for Section 3 of the CBA report (Life Cycle Costs and Benefits). For each WBS element, there is a need to research the element, identify appropriate data sources, collect supporting information, validate the information, and decide how calculations will be done. As this is done, there will probably be some additions to the assumptions, some of which will be relevant to the overall project. These additions should be added to Section 1 of the report (Project Overview and Background). Other additions will apply only to the specific WBS element.

Once these reports, or something similar, are completed for an alternative, the costs can be summarized on a single cover sheet by individual WBS element. The details of each WBS element estimate can be put in an Appendix to the cost-benefit analysis to document the analysis for the alternative. Each alternative is generally put in a separate appendix that can be titled "Detailed Costs for Alternative X." This information is then used to write Section 3 of the report. In that section, summary tables can be built from the detailed data to display only the relevant information needed by the decision makers.

The remainder of this subsection addresses the general techniques that the agency will probably use to estimate costs and benefits.

Estimating and Analyzing Costs

The purpose of cost estimating is to translate specific physical resources into costs. The process of identifying development, acquisition, and operating costs and benefits is necessary, even if the formulas and cost elements are not well defined. When values for a task cannot be finitely determined, the agency may have to use a methodology such as the parametric method discussed below to estimate an approximate value. To do this, the cost-estimating relationships (CERs) used may be simple extrapolations based on some quantifiable recent experience or complex equations with many variables. An alternative is to use average values from a variety of sources.

Depending on the size of the project, its complexity, and how far along in the development cycle it is, a combination of the techniques discussed below will probably be used to estimate the total costs and benefits. The total cost will include all differentiating costs (among alternatives) for all elements used to research/study, design, develop, integrate, test, acquire, deploy, manage, operate, and dispose of the new/modified processes or systems. Specific techniques that may be used to estimate costs include the following:

- ***Parametric Method***. This approach is generally used early in the life cycle as the primary method to support reviews because only limited definition is available. Collect relevant historical data and derive cost-estimating relationships that relate cost as the dependent variable to one or more independent variables that reflect the physical or performance characteristics of the system or process. The appropriate descriptive statistics, the database used to develop the cost-estimating relationships, and the assumptions used for the cost-estimating relationship are then used as supporting data for each WBS element's estimate. As part of the analysis, it is important to ensure that cost-estimating relationships are relevant, consistent, and accurate, and that the element being estimated is not outside the bounds of the database used to derive the cost-estimating relationship (i.e., an anomaly).

- ***Analogy Method***. This method is used when a new initiative's content can be compared with completed projects or catalog prices whose costs and similarities are known. Select a "nearest neighbor" and adjust its costs for differences between the new project and the known project. This process includes defining comparison complexity factors (more or less complex and a relative measure of how much).
- ***Bottoms-Up/Engineering Method***. This method is generally applied later in the program. It is a detailed approach whereby the project is decomposed into discrete activities and the labor, material, and other resource units (e.g., hours for labor) are quantified based on known

factors so that costs can be applied to them.

- ***Actual Cost Method***. This method uses current program/project office and contractor performance experience from prototypes, engineering, and testing to analyze cost and schedule variances and project completion estimates, evaluate contractor's estimates, and assess potential adjustments.

At this point there will be a tailored WBS element structure to reflect the project's relevant cost and programmatic issues, to identify the relevant assumptions and ground rules, to define feasible alternatives, to investigate specific estimating methodologies, to gather and document the sources of data, and to estimate each WBS element. Throughout this process, the agency needs to continually assess what is being done to ensure that all relevant elements are costed and based on realistic development plans, implementation scenarios, and on sound operational and maintenance concepts.

Estimating and Analyzing Benefits

Next, the agency will estimate potential benefits. They include quantifiable savings and cost avoidances as well as non-quantifiable benefits. The task of developing and validating benefit estimates as part of a cost-benefit analysis involves quantifying program data, resources, and opportunity costs and benefits and then aggregating them by alternative. Alternatives should be analyzed for their ability to do the following:

- Maximize benefits and outputs, equal costs (most effective). Minimize costs, equal benefits and outputs (most efficient).
- Maximize differential output per dollar difference, unequal costs and benefits (return on investment).

While the basis outlined above for determining costs is important for that purpose, it is also important for providing a complete picture of feasible alternatives for a new process or system—both quantifiable and non-quantifiable. To ensure that all the benefits have been identified, an initial list should be developed. Next, use Delphi techniques (request expert opinions) to complete the list. Categorize the benefits as quantifiable or non-quantifiable, and group them within these categories to define the type of benefit being derived (availability, functionality, maintainability, productivity, etc.).

Next, someone should estimate quantifiable savings and cost avoidances using the same techniques outlined above for determining costs. Advantages in operational improvements should not be double counted. Equally important to decision makers is an assessment of non-quantifiable benefits such as improved management information, versatility, and flexibility. Although dollar savings cannot always be determined for these types of improvements, they can be compared through standard statistical scoring or weighting techniques.

Step 3: Identify Major Cost Drivers

A few cost drivers or WBS elements will influence the accuracy or results of the estimate more than others. They are usually the ones that make up most of the cost, or, if they do not, they are critical and have enough uncertainty associated with them that they could change the outcome if a few variables

Cost Benefit Analysis

were altered. Identify these WBS elements and the variables associated with them so that their stability can be tested, and see how little or how much they can change before the information to support the conclusions would yield a different result.

Step 4: Analyze Risk and Sensitivity

Sensitivity analysis determines the degree to which costs and benefits are sensitive to changes in factors such as hardware configuration or length of service life. The analyst should use different quantitative values for cost/operational assumptions or factors to test whether the conclusion of the cost-benefit analysis changes with this change in a factor.

Risk and uncertainty analyses are similar, except that risk analysis deals with a measurable probability distribution and uncertainty does not. Risk analysis therefore deals with the spectrum of possible outcomes that exist within certain confidence limits. An event is risky when the probability distribution can be defined, and it is uncertain when no probabilities can be estimated regarding its occurrence. Contingency analysis is a type of uncertainty analysis that deals largely with significant qualitative uncertainties.

Because most decisions and cost estimates support these elements of uncertainty, the analyses should be accompanied by an assessment of risk and uncertainty, especially for the major cost drivers. The elements should also be organized in a way to identify, quantify, and measure the potential costs associated with risk. Some common analysis techniques include the following:

- Contingency Analysis
- Risk and Uncertainty Analysis
- Sensitivity Analysis
- Parametric Analysis

Contingency Analysis
This is an evaluation of a set of conditions to determine the technical, financial, or business risks. This type of analysis (versus risk, uncertainty, or sensitivity analyses) identifies how alternatives might be affected by potential changes in criteria for evaluating alternatives, ground rules, or general environmental changes. These changes include technology change and political issues. Based on the conclusions, specific impacts and alternatives can be addressed using the risk and sensitivity analyses techniques described below.

Risk and Uncertainty Analysis
Risk analysis is generally defined as the consequences of uncontrollable random events from a known probability distribution (e.g., rolling dice). For uncertainty analysis, the probability distribution is unknown. This situation is often referred to as unknown unknowns. These instances can be associated with WBS elements, and then probabilities can be assessed to derive point estimates for schedule, technical, and cost risks. The agency can then use this information to select an appropriate distribution (normal, triangular, beta, etc.) and postulate probable outcomes using a Monte Carlo simulation (a risk assessment technique to calculate a distribution of likely results) to develop a risk value table. This table, like the one shown below,

Cost Benefit Analysis

can then provide the potential cost impacts for given probabilities of success and failure. This approach can be used for individual program cost elements and then summarized for the total program life cycle.

An example of an individual WBS element risk value table might appear similar to the table below, where the agency thought its estimate had a 50% probability. If the agency wanted to increase the probability of success to 80%, it would add another $5 million to the estimate. Conversely, if it were willing to live with only a 20% chance of success, it could reduce its estimate by $5 million. In reality, what generally happens is that the agency places the differences into a contingency reserve.

See the Risk Planning subsection of this methodology for more information on risk analysis.

RISK VALUE TABLE

PROBABILITY OF SUCCESS - FAILURE (%)			ASSOCIATED COST (millions)
20	–	80	$15
50	–	50	$20
80	–	20	$25

<u>Sensitivity Analysis</u>
While this analysis can use some of the same statistical techniques as risk and uncertainty analysis, it is generally used to assess how much a key project parameter or major cost drivers must move before a different decision would be made. That is, it assesses how sensitive to change the ranking of alternatives is based on varying individual cost drivers. To do this analysis, instead of using expected values (e.g., point estimates), use high/medium/low values or frequency distribution techniques.

<u>Parametric Analysis</u>
This technique is employed to test cost-estimating results and projections and mathematical relationships used to estimate a program's elements. Use curve-fitting techniques to develop the estimating relationships, and then use statistical analyses to validate usage and fit. Finally, analyze the significance of the curve fit and its relevance to estimating the program’s elements to ensure that (1) the relationships being used do not fall outside the bounds of the data, and (2) no anomalies are in the data that should have been adjusted prior to fitting the selected curve.

Step 5: Analyze Alternatives

In addition to comparing total costs and benefits among alternatives, other techniques are usually needed to understand which choice is really the best. Depending on the size and complexity of the project, several common procedures are often used to compare alternatives:

- **Present Value (PV) Analysis.** Once costs and benefits are estimated and the major cost drivers are identified and assessed for risks and sensitivity, the results need to be time-phased and compared in constant- (base-year), current- (then-year), and present value dollars. Current dollars reflect inflation. The present-value analysis is done to show the discounted cash

Cost Benefit Analysis

flow of the various alternatives' investment streams using an expected investment percentage return. Where the life cycles are of unequal length, use uniform, annual, present-value costs to compare alternatives. This technique of discounting expected costs allows the results of alternatives to be compared despite different expenditure patterns.

- **Return on Investment**. This technique looks at what the agency is getting (benefits) for the amount it is investing (cost) in development and implementation (nonrecurring costs). Return on investment is also generally looked at in terms of present value dollars. The rate of return is the discount rate at which the present value of the savings is equal to the present value of the investment cost through the remaining life cycle of the project being evaluated.
- **Break Even Analysis**. This analysis looks at how long it takes the agency to recover its investment. The break-even point is the point, say a number of years into the future, at which the cumulative savings (alternative—as-is) become positive. This metric is often used when there is a desire to recover investment costs quickly or generate economic or political benefits quickly.

Step 6: Present the Results

The depth and formality of cost-benefit analysis should be consistent with the complexity and potential cost of the project. The analyst must exercise judgment and use his or her knowledge of the environment, the budgets, and the project to decide how much effort is invested in documenting the results. It may be as simple as a white paper, briefing, formal report, or a combination of these.

Cost Benefit Analysis Template

The Cost Benefit Analysis Template can be found on the following page, as well as in Appendix B.

Cost Benefit Analysis Template

State of Michigan
(Insert Agency Name Here)
Cost Benefit Analysis

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Project Overview and Background

Provide a brief overview, background and definition for the project.

C. Discussion of Alternatives

Discuss the project ground rules and assumptions.

Status Quo – Current Process (As-Is Model)

Discussion of Alternative Concepts and Goals

Program Concept

Functional Concept

Technical Concept

Cost Benefit Analysis Template

Project Alternatives (To-Be Model)

Acquisition Strategy

Discussion of Alternatives

Schedule

D. Life Cycle Costs and Benefits

Discuss the costs and benefits of the product according to its life cycle.

Life Cycle Cost Summary

Life Cycle Benefit Summary

Risk Analysis

Risk Sensitivity Analysis

Life Cycle Cost-Benefit Comparison

Resource Planning

Resource Planning

The resource planning component includes the ability to plan and manage the resources required to deliver a project. This starts with the agency selection and assignment of the project team and includes the management of the resources assigned to that team.

Overview of Resource Planning

Every agency has a limited number of resources to perform tasks. A project manager's primary role is to find a way to successfully execute a project within these resource constraints. Resource planning is comprised of establishing a team possessing the skills required to perform the work (labor resources), as well as scheduling the tools, equipment, and processes (non-labor resources) that enable the staff to complete the project.

The relationship of resource planning to the rest of the Planning Phase components is shown in Figure 3.16.

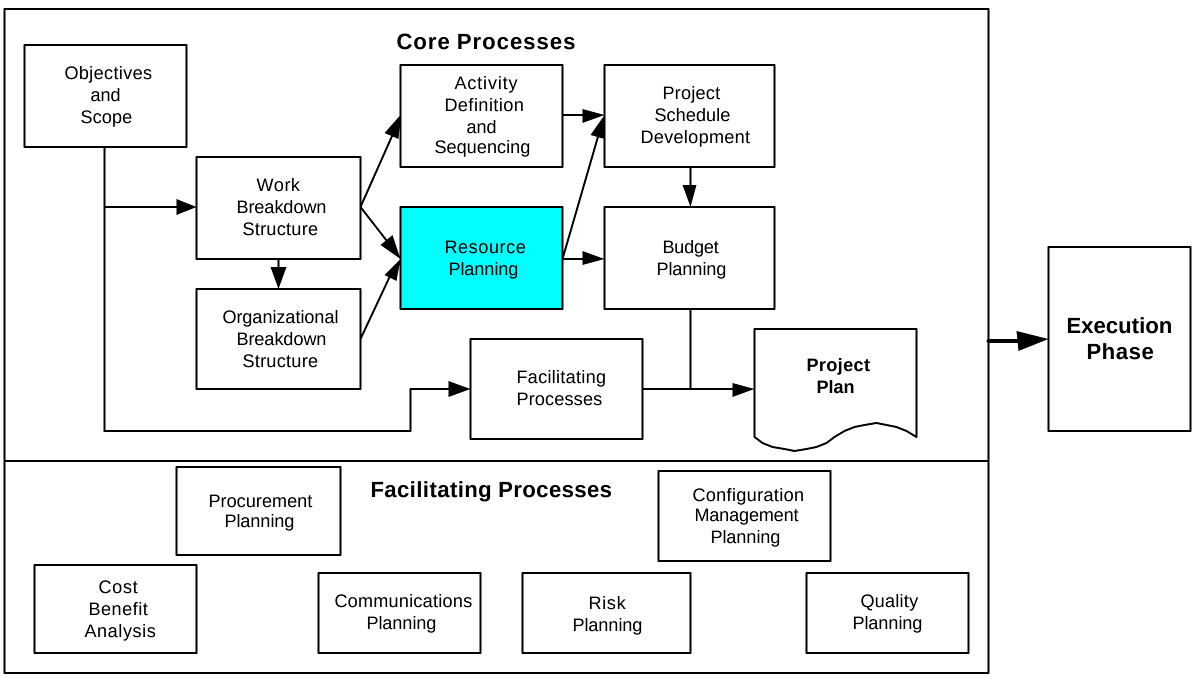

Figure 3.16
Resource Planning Identified in the Planning Processes

Labor Resources

Labor resources are also known as "human resources". There are several parts to planning for the labor resource needs of a project:

- Determining the resource pool
- Estimating the skill requirements
- Determining the size of the project team
- Resource profiles
- Forming the team
- Creating resource charts

Resource Planning

Determining the Resource Pool

As stated, resources usually are in limited supply. Therefore a project needs to establish its pool of available resources. The resource pool typically specifies the type, level (e.g., skill and experience), and time period that the resource is available. The resource pool is usually stored in a database to enable its analysis with project management tools.

Estimating the Skill Requirements

Finding available staff with the skills required to perform a task is critical to project success. The project manager, for example, makes assumptions about the skills of the person performing a task. The skills of the people performing the work are directly related to the time that it takes to perform a task.

It is helpful in the planning process to develop a list of skills required, first for execution of the project and then for execution of each task. This skills list may then be used to determine the type of personnel required for the task.

The project manager pragmatically assesses the skills of the available people on the project. The project manager's job is to determine the risks associated with the available skills and to build a plan that realistically accounts for those skills. Unfortunately, skill level is not a yes/no factor. People have varying degrees of skill, and the project manager needs to determine the level of schedule adjustment that should be made based on the staff skill level.

Where staff with the necessary skills is largely unavailable for assignment on the project, the project manager has an option to hire the necessary talent or contract services to perform the work.

Determining the Size of the Project Team

The optimal size of the project team is driven by two principal factors. One is the total number of tasks to be performed, and the other is the effort needed to perform the tasks.

In developing the schedule and assigning the resources, the project manager determines the optimal mix of staff to activities. Doubling resources does not necessarily double productivity. For example, 365 engineers could not complete in a day a project estimated at one person per year. At some point, people begin to get in each other's way. The significance of the project duration, as well as each major activity's duration, needs to be clearly understood and documented as part of the scheduling process.

Adding more people to an activity creates the need for additional communication and may also increase the need for equipment or tools. Large teams require a significant amount of coordination and teamwork. Sometimes a smaller team can accomplish much more than a larger one in a shorter period of time. The optimal selection also depends on the personalities of the team members and the communication and organizational skills of the project manager.

Having personnel on board when they are not essential is extremely costly. It is important for the project manager to understand the size of the team

Resource Planning

required to perform the weekly scheduled work. For this reason, significant effort needs to be made in the Planning Phase to identify the resources required to complete each task at the appropriate time.

Resource Profiles

A staffing plan is developed for each project. The staffing plan may be as simple as identifying one person to develop a simple database. For more significant projects, the staffing plan identifies when and how staff is brought onto and taken off the project team. For small projects, this may be simply stated as the assignment of three people full time to the project throughout its six-month duration.

For large projects, the problem is much more complex, and the creation of a detailed plan is a requirement. A graph similar to Figure 3.17, is useful in the Project Plan for large projects.

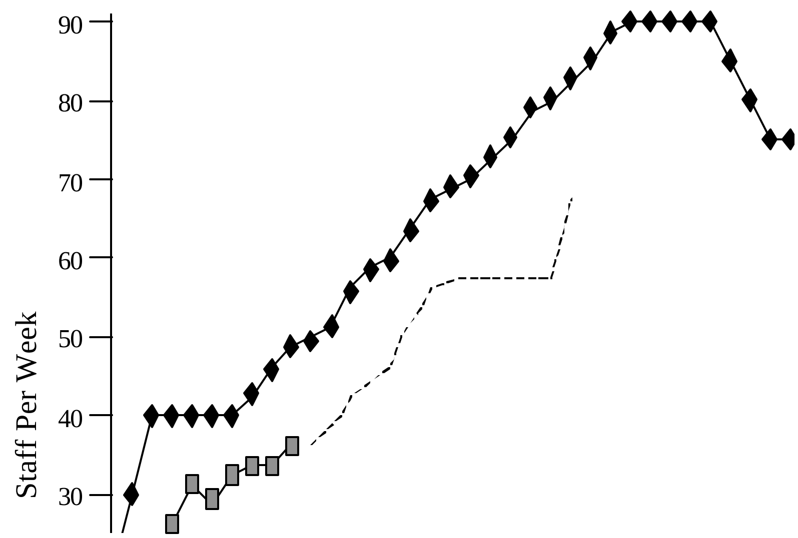

Figure 3.17
Example Staffing Plan

Figure 3.17 shows the planned number of people required per week for a project team. The graph also depicts how actuals might be applied in the performance of the project.

The graphic representation of the staffing plan helps to point out peaks and valleys in staffing that has the potential of presenting serious project management problems. The project manager realistically determines how a relatively consistent staffing level can be maintained. The project manager must pay particular attention to releasing resources when they are no longer needed on the project. It is unrealistic to assume that the project can go from a five-person level to a ten-person level of effort in a month and then return to a five-person effort in another month. Resource leveling is supported by many project scheduling tools, but requires the special attention of the project manager in both the Planning and Execution Phases of the project.

Resource Planning

Forming the Team

Project organization is used to coordinate the activity of the team and to define the roles and responsibilities of team members. Project organization is needed for every project, and the project manager must always be identified.

Confusion and lack of productivity are the result of poor project organization. This is where many projects run into trouble. A good organization facilitates communication and clearly defines roles and responsibilities.

There are numerous ways to organize a project, and many projects require a unique organizational structure. There are no standard organizational methodologies that every project should use. A sample organization diagram is displayed in Figure 3.18 and shows the types of functions that are often assigned to a project.

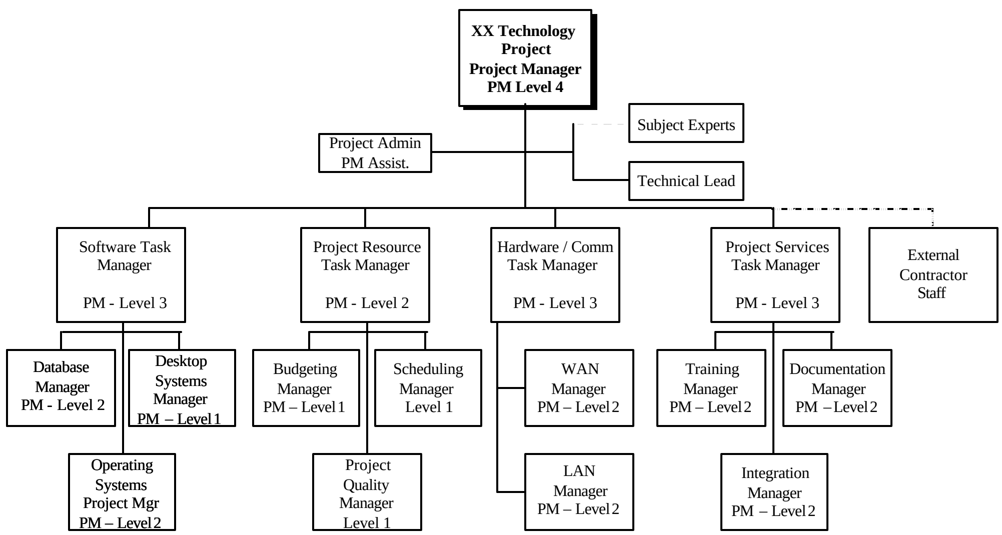

Figure 3.18
Sample Organization Chart

The larger the project, the more critical the organizational structure becomes. In a small project, a single team member may be responsible for several functions, whereas in a large project, each function might require full-time attention. A very large project, for instance, often requires a deputy project manager. A small project might have the senior technical staff member serving as a project manager. Definition of the project organization is a critical part of the planning process.

Project complexity is also a major factor when organizing a project. For example, a project that includes a large software development component typically includes a software development manager and a project manager. This arrangement allows for a concentration of resources on a high-risk area.

Unless a project is extremely small (about five people), it is useful to organize the project into functional teams. This approach leads to idea synergy and improved communications. The project manager is responsible for defining and selecting the team leaders. Team leaders can off-load some of the work of the project manager and take responsibility for the completion of tasks. Team composition should be determined early in the planning phase, so that leaders are involved in the planning and also assist in defining a successful Project Plan.

Creating Resource Charts

Because the Niku Portfolio Manager Suite (the State's Enterprise PM Tool) is a dynamic and resourceful project management tool, project managers should utilize the option to load resources directly against tasks according to the work breakdown structure or by another means. This is an important step because the project manager will then be able to track resources and resource needs as far down as the task level.

Non-labor Assets

All project teams require the tools to successfully perform the tasks assigned. In scheduling resources, the project manager must ensure that both people and necessary equipment to support those people are available simultaneously.

The need for adequate workspace is often overlooked when planning a project. If a 15-member project team is going to start work, there must be a facility to house the team. Ideally, the team should be placed in contiguous space (collocated) to facilitate interaction and communication. Team spirit and synergy is enhanced and chances for project success are increased when everyone is close together. While this may not always be feasible, it is a goal worth striving towards.

In addition to workspace, equipment for the team should be included in the Resource Plan. Ensuring the availability of equipment at critical points in the project is key in planning a successful project. Efficiency and morale are negatively affected by unavailability of equipment needed to perform a task. When considering equipment, it is also important to remember to give each team member the right tools (for example computer software) they need to do the job at the beginning of the project, ensuring that all people who need to share information can do so quickly is a time- and labor-saving effort.

Additional Criteria

Identifying Resource Risks

Risks are inherently involved with scheduling resources. Sound resource planning makes allowances for dealing with risks in one or more of the following ways:

- Where significant resource risks are identified, add a work breakdown structure task for risk management/risk reduction, and set aside financial reserves to deal with potentially delayed schedules.
- Add time to those tasks where resources are known to be a problem. There is no rule of thumb for this multiplier; it depends on the degree of risk and the overall impact that resource problems can have on the project.
- Add a percentage time multiplier to the schedule for specific individuals, particularly if new technology is being used or if the person providing the estimate is extremely optimistic. Remember that technical staff typically

Resource Planning

underestimate the time required to do any particular task.

- Where skill shortage is identified, add time and resources for training. By recognizing resource shortfalls and providing the necessary training, a project manager mitigates some level of risk.

Task Responsibility
The schedule owner is usually a manager. The individuals doing the work are usually not managers. To facilitate communication, a person responsible for completing each task should be identified. This will improve the individuals' understanding of the tasks they must accomplish and provide a point of contact to obtain schedule status. Identifying the person responsible makes it possible to produce reports for each person.

Team Development

Team development is an important aspect of resource planning that is often overlooked. This is often viewed as an Execution Phase issue; however, if thought through early in the planning of the project, the issue can be dealt with during the Planning Phase.

Team development revolves around activities that are directed to enhance the cohesiveness of a team and get a better understanding of its strengths and weaknesses. Quite often the problem lies in team members seeing the work they do as functionally independent of other team members and therefore contributing very little, if anything, to the team itself.

The benefits of team development include improvement in project performance, improvements in agency skill areas, improvement in team interaction and behaviors, and a feeling of team satisfaction. The following are examples of team development tools and techniques:

Team Building Activities
Activities that provide interaction among team members and two-way communications are encouraged. These include events such as team-building activities in which the project team members spend time together doing work-related or non-work-related activities in order to build a sense of team unity. Team-building activities can be work related, such as meetings in which different people discuss their views on project issues, or they can be fun extracurricular activities.

Collocation
In today's workplace with limited office space and functional specialties, it is sometimes difficult to collocate project team members. If the option of having all of your team members sit together is available, however, take advantage of it. Collocation fosters increased communication and often quick problem solving.

Training
The idea behind training is to increase and hone the skills of the project team to improve project performance. Training can be both formal (taking classes in particular skill areas) and informal (receiving feedback from managers and team members). Project team members benefit professionally from learning new skills, and that benefit is returned to the project in the form of increased productivity and better products. Training is an element that should be considered early based on the skill needs of the project team, and

Resource Planning

funds should be allocated for training purposes.

Resource Plan Template

The Resource Plan Template can be found on the following page, as well as in Appendix B.

Resource Planning Template

State of Michigan
(Insert Agency Name Here)
Resource Plan

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name: ______________ ***Date:*** ______________

Controlling Agency: ______________ ***Modification Date:*** ______________

Prepared by: ______________ ***Authorized by:*** ______________

B. Resource Profiles

Determine the major resources that will be needed in order to proceed with the execution of the project. These resources may include the following: People, Money, Equipment, Facilities, Materials and Supplies, and Information Technology.

C. Project Resource Information

For each of the resources needed on the project determine the following: 1) Cost estimates for each resource, 2) Availability of each resource, and 3) Estimated quality and output of people and equipment resources.

Resource	Cost Estimate	Availability	Quality	Output

Resource Planning Template

D. Resource Staffing Plan

After establishing the human resources required for the project, develop a staffing plan that shows the number of personnel, by type, that will be required on the project on a monthly basis.

Personnel Category	Month	Month	Month	Month	Month	Month

Project Schedule Development

Project Schedule Development Introduction

Following the definition of project activities, the activities are associated with time to create a project schedule. The project schedule provides a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration, and deadlines. The project's master schedule interrelates all tasks on a common time scale. The project schedule should be detailed enough to show each work breakdown structure task to be performed, name of the person responsible for completing the task, start and end date of each task, and expected duration of the task.

The relationship of project schedule development to the rest of the Planning Phase components is shown in Figure 3.19.

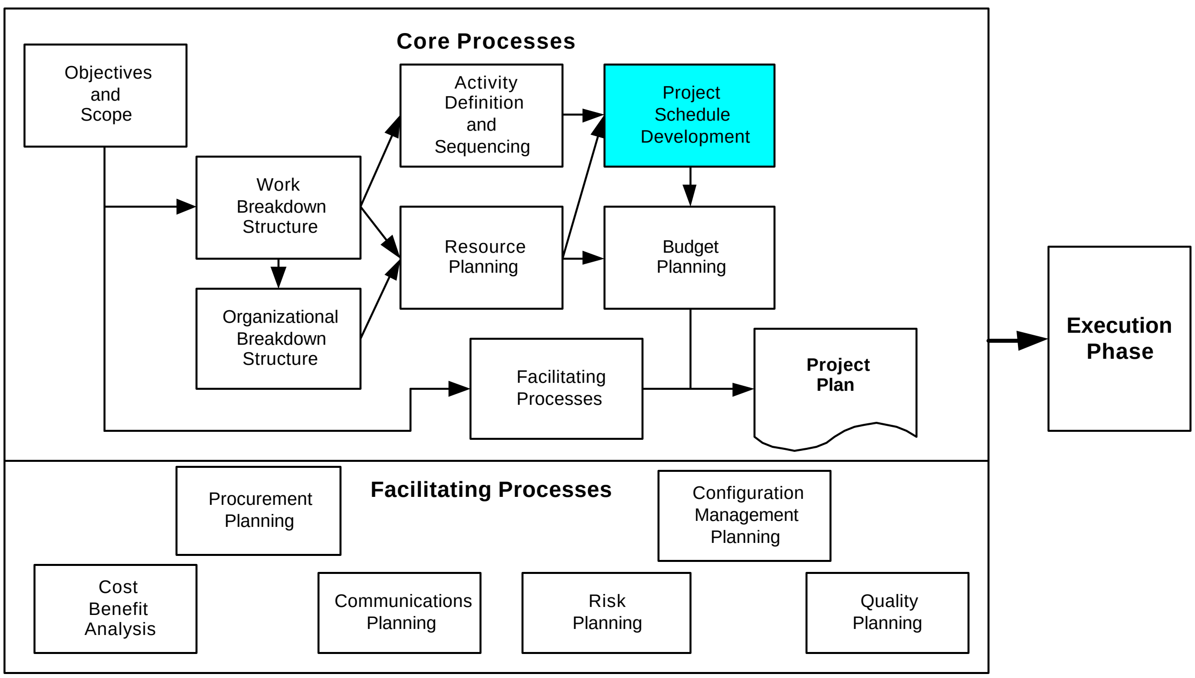

Figure 3.19
Project Schedule Development Identified in the Planning Processes

Like the development of each of the project plan components, developing a schedule is an iterative process. Milestones may suggest additional tasks, tasks that may require additional resources, and task completion may be measured by additional milestones. For large, complex projects, detailed sub-schedules may be required to show an adequate level of detail for each task.

Once completed and approved by the project's key stakeholders, this schedule will be used to manage the project and will be known as the "baseline schedule". During the life of the project, actual progress is frequently compared with the baseline schedule, which allows for evaluation of execution activities. The accuracy of the planning process can also be assessed.

Basic efforts associated with developing a project schedule include the following:

Project Schedule Development

- Define the type of schedule
- Define precise and measurable milestones
- Estimate task durations
- Define priorities
- Determine task relationships
- Identify lead/lag between related tasks
- Define the critical path
- Document assumptions
- Identify risks
- Review results

Overview of Project Scheduling

The type of schedule associated with a project relates to the complexity of the implementation. For large, complex projects with a multitude of interrelated tasks, a Network Logic Diagram (commonly referred to as a "PERT chart"– Program Evaluation and Review Technique) may be used. The Network Logic Diagram depicts interdependencies and associations which allows planning to include these relationships. A key feature of this method is the ability both to determine and to show the critical path of the project (see below for a discussion of critical path). A sample Network Logic Diagram is shown in Figure 3.20.

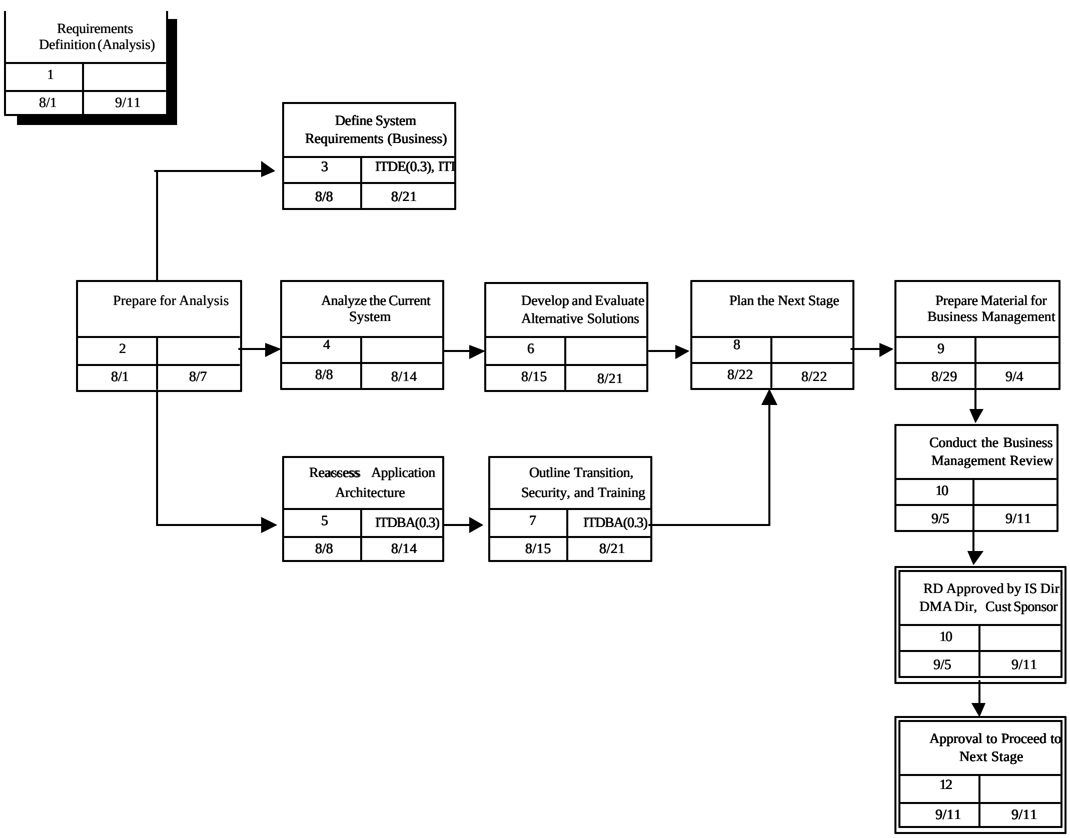

Figure 3.20
Sample Network Logic Diagram

Project Schedule Development

For small projects, a Gantt chart (or bar graph, named after Henry Gantt) is adequate. These schedules are two-dimensional representations that show the tasks and the time frame for completion. The Gantt chart is common in reporting status and in defining the schedule for small, simple projects with few interrelationships. A sample Gantt chart is shown in Figure 3.21 below.

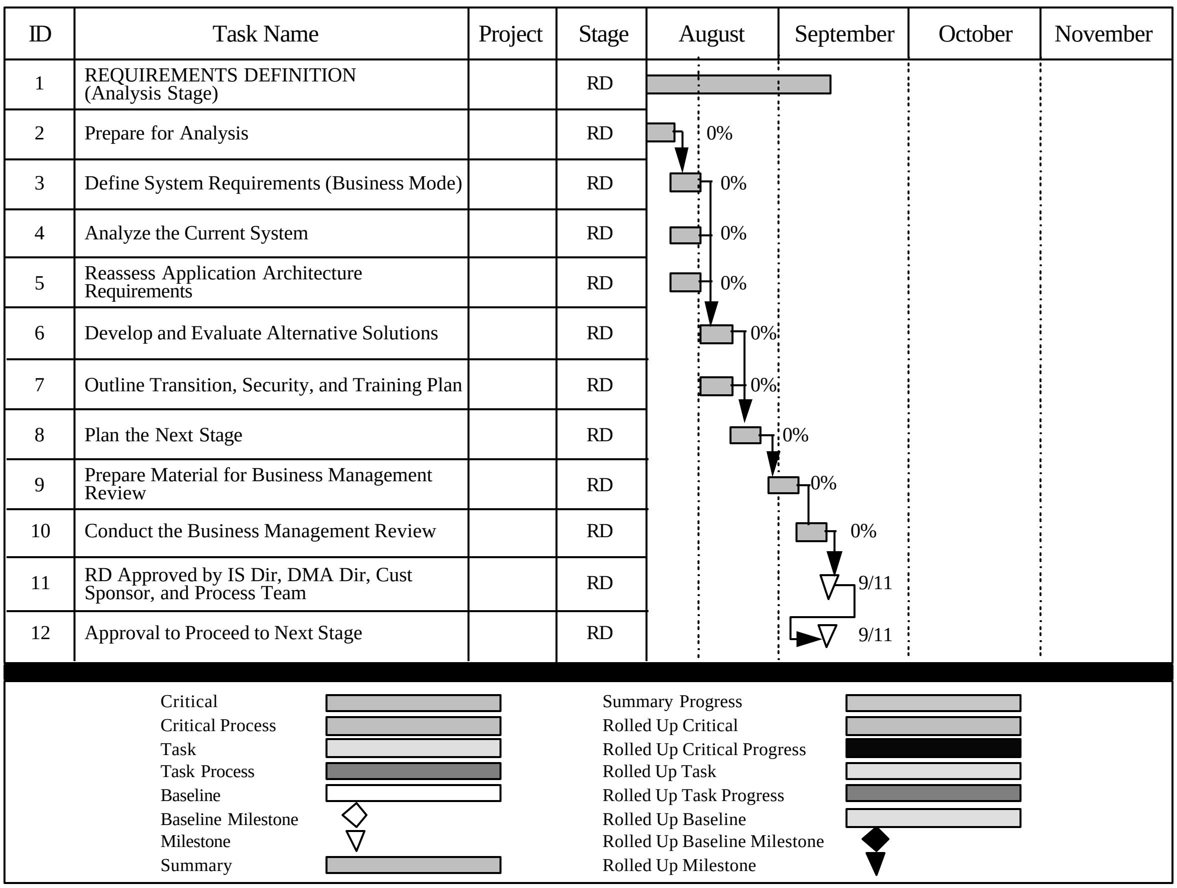

Figure 3.21
Sample Gantt Chart

Project Schedule Development

The Schedule Process

Figure 3.22 depicts the schedule process.

The first three steps of the process are discussed in this section of the Project Management Methodology, while the fourth step, Schedule Status, is a controlling function that is discussed in detail in the Section 5, Project Control.

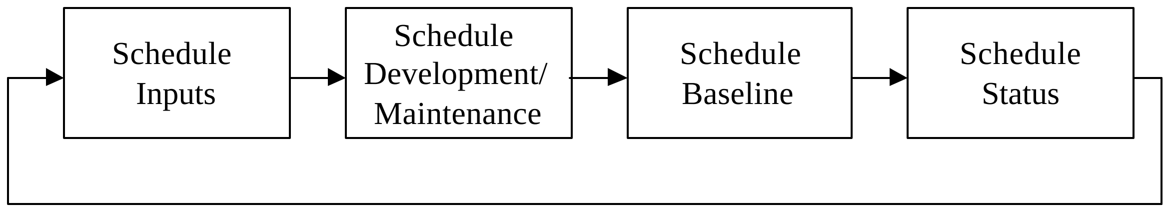

Figure 3.22
Schedule Process

Schedule Techniques

Schedule techniques provide a framework for developing and communicating the project's schedule performance. The techniques should be chosen based on the agency's management style, the project manager's management style, and the nuances of the project. Communicated, understood, and approved by management, the techniques chosen will ensure that schedules provide the benefits intended. The following are some schedule techniques:

- Schedule detail
- Schedule display
- Schedule structure
- Schedule data collection and validation
- Automated tools

<u>Schedule Detail</u>

Schedule detail involves the degree to which activities are detailed. A schedule for a project could plan to the hour. Although this degree of detail would be impractical for a five-year project involving hundreds of people conducting thousands of tasks, the degree tracked must be determined before developing schedules. Areas within the project that have a high degree of risk may be planned in greater detail, while others may not.

Rolling-wave planning introduces the concept of developing detailed schedules only for areas within a specified time frame or when sufficient information exists to plan in detail. For example, a detailed installation schedule for several sites may not be developed three years in advance of installation. Also, it may be developed only when sufficient information exists to identify tasks, task durations, sequencing, and interdependencies with other schedules.

As a technique, the usefulness of rolling-wave planning depends on each project manager's confidence in high-level planning. Determining its applicability early in the planning process can reduce the amount of time spent developing detailed schedules that will change as a result of improved information. Identifying risk areas within a project should provide an indicator as to which areas require more detailed planning.

Figure 3.23 depicts the concept of rolling-wave planning.

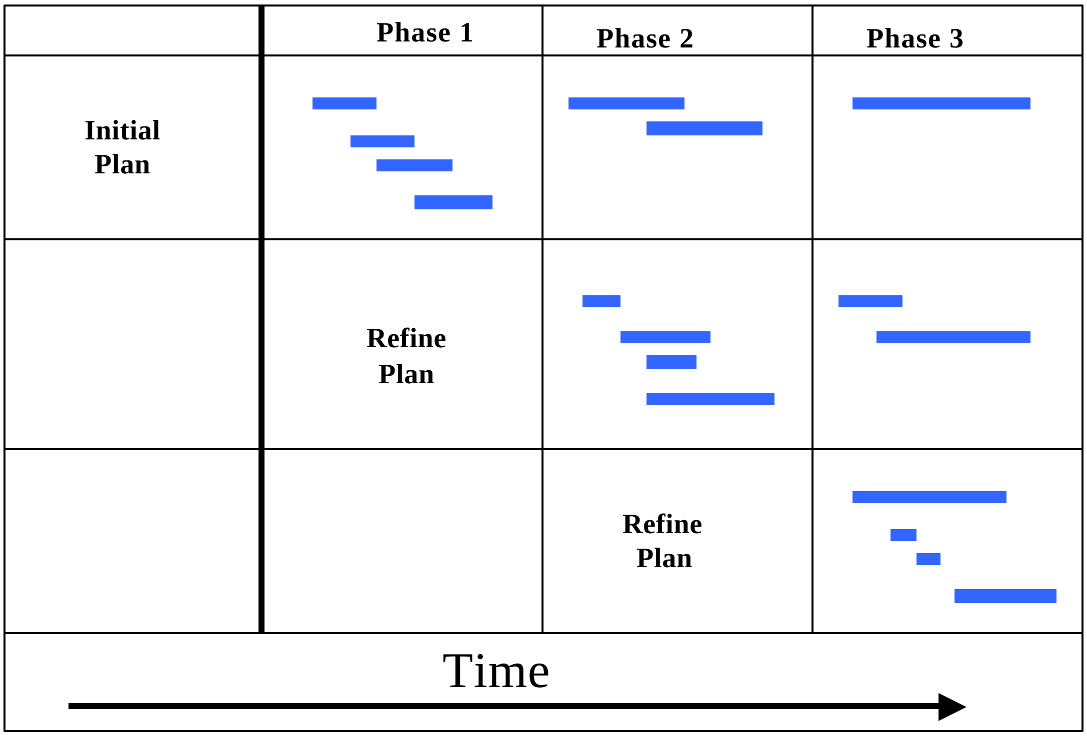

Figure 3.23
Concept of Rolling-Wave Planning

The chart depicts an initial plan that consists of a greater degree of detail for the early phases of the project. Later phases within the initial plan contain less and less detail as they move further out in time. During each phase of a project, subsequent phases are reviewed and refined when improved information is available.

Caution should be used when implementing this technique as a tendency may exist not to plan sufficiently during the early phases of the project. Thorough planning is necessary to come up with initial schedule and cost estimates and risk identification.

Detailed planning involves creating a detailed schedule for all components of a project, independent of their timing. In the site installation example mentioned above, detailed scheduling would require task definition, duration, and dependencies for all sites to be installed. On the one hand, the benefit of detailed scheduling is the potential for better estimates. On the other hand, detailed schedules created far in advance are often changed by new or improved information. Changing those schedules may be burdensome.

Project Schedule Development

Schedule Display

Schedule display refers to the summation of schedule information presented to various levels of management. Detailed schedules may contain hundreds or thousands of tasks and milestones; displaying these to the executive level would not be productive, as upper management frequently requires summarized information that highlights potential or real problems. Once the problems are highlighted, upper management may proceed to lower levels of detail to understand the impact of a problem on the project and determine corrective action. The number of displays depends on the project's size, its complexity, the number of agencies affected, and the degree of senior management visibility and involvement in the project. The table below identifies typical schedule displays and the intended audience.

Schedule Name	Intended Audience	Comments
Executive	• Executive Management • Agency Chief Information Officer • Agency Director • Board of Directors • Oversight Committee • Executive Customers	Recipients are stakeholders, but do not have direct involvement or control of the project. The executive schedule usually depicts high-level milestone information only.
Master	• Project Manager • Senior Customer	Displays key milestones and high-level, summarized activities or phases of the project. Usually contains the executive schedule's information and a logical grouping of information from intermediate schedules. Also referred to as an "integrated program schedule", because it integrates multiple project schedules.
Intermediate	• Project Manager • Senior Customer • Functional Manager • Line Management	Contains summary and key tasks and milestone information of the detailed schedules. Often reflects a logical grouping of the project (phases or business process).
Functional	• Functional Manager	Depicts schedule information based on the responsibility of a functional group.
Detail	• Functional Manager • Team Leader • Individual Team Members	The lowest-level schedule used to control the day-to-day activities of team members.

Information portrayed at any level is obtained from the detail schedule of the project, thus ensuring consistency in the information. The type of information displayed should be determined early in the process. This will ensure that the information displayed is useful to all management levels.

Schedule Structure

Schedule structure involves storing and associating schedule information for later use. Schedule structure is directly influenced by the displays chosen. The way a schedule is structured is based on many factors, each of which must be understood so that the project schedules are organized to facilitate communication.

Project Schedule Development

Factor	Impact
Work breakdown structure – based schedules	Schedule tasks must be associated with the work breakdown structure. Displays are WBS-based.
Functional organizations	Functional organizations may want displays and control of their own schedules. Each functional group's schedule may be isolated into a separate schedule.
Process-based schedules (lifecycle based)	May involve phases of a project or relationships of tasks to a business process. If a work breakdown structure is also used, two different associations are required (the work breakdown structure and process).
Integrated master schedule	Will require separate schedules for subprojects that are integrated by a single master schedule. Rollup mechanisms must be defined to update the integrated master schedule from detailed subproject schedules.
Subcontractor schedules	Will require defined automated or manual techniques to integrate with other project schedules and roll up to the integrated master schedule.
Customer access	The number of individuals involved in updating the schedules may create a data, and thus a schedule, integrity problem. Data access by customers should be considered to ensure that the schedule is updated to reflect current status and work effort.
Automated tool	The tool chosen will directly affect the ability to structure schedules, associate project information (for example, work breakdown structure and function), use project/subproject schedules, and allow customer access. In the case of the State of Michigan, the tool of choice is the Niku Portfolio Manager Suite.

Within one project, any or all the factors may affect the way schedules are structured. Figure 3.24 is an example of display and structure attributes. An integration schedule is used to link tasks and milestones of different schedules. In this way, an integrated schedule can be created that shows a true picture of the project.

Project Schedule Development

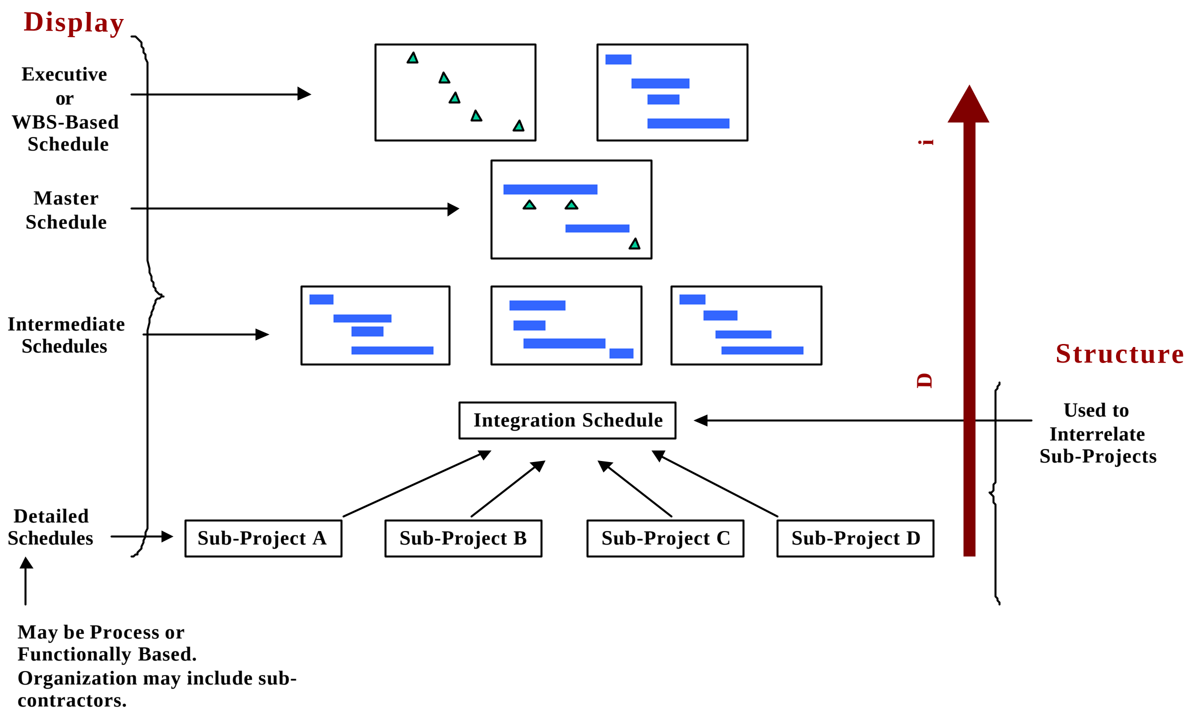

Figure 3.24
Schedule Display and Structure

Automated Tools
There are numerous tools that support the development of project schedules. Many of these tools prepare either a Gantt or a PERT chart. These tools require experience in setting up projects and in defining task relationships and dependencies.

The State of Michigan has selected Niku Portfolio Manager Suite as its scheduling tool of choice. It is suggested that all project managers and project team members who will be working with project schedules take the time to get trained and become familiar with the Niku Portfolio Manager Suite and its features. Microsoft Project is an acceptable alternative scheduling tool for smaller, non-complex projects.

Schedule Inputs

Inputs to schedule development include any aspect of the project that directly or indirectly affects how the project will be delivered. The following table provides a list of inputs and how they are used to develop schedules.

Input	Comment
Scope	Scope is defined in the WBS. Each element of scope should have a defined schedule that depicts how it will be delivered.
Agency	Agency will affect the schedule through responsibility assignment (identifying the agency responsible to deliver scope or conduct activities).

Project Schedule Development

Input	Comment
Resources	The resources assigned to the agency will constrain schedules. The impact may be through either the number/availability or skill level of the team.
Strategy	Strategy refers to the business process or lifecycle process chosen for the project. Additionally, strategies will affect contracting or subcontracting, release strategies, or any aspect of the project that requires optional approaches ; for example, make/buy alternatives.
Assumptions	Assumptions form a premise for a chosen solution; they are important in that they provide the rationale for a given solution. Assumptions should be reviewed continually, as they may be risks to the project (one may assume that the product will be available for test on a given date or that requirements will not change).
Constraints	Constraints are project attributes that restrict certain aspects of the project. Examples are • Time-frame limits • Funding limits • Resource limits • Technical limits
Historical data	Historical information should be consulted.
Risk	Risk areas should be reviewed carefully and schedules developed to a level of detail that can provide control over them. Risk mitigation or contingency plans should be defined within the schedules as appropriate.
Dependencies	Dependencies define relationships between agencies and tasks and provide a logical sequencing of the schedule. Dependencies provide the basis to calculate the schedule and attributes of Critical Path Method (CPM) analysis.
Change	All changes in scope, strategy, and work effort should be used to develop and maintain schedules.

Schedule Development and Maintenance

Schedule development and maintenance have the following objectives:

- To create a project schedule that displays a logical sequence of tasks to deliver the project.
- To create a mechanism that portrays an accurate status of the project so that it can be used to control the project work effort.
- To create a mechanism that can be used to understand the impact of change on the baseline schedule.

Figure 3.25 depicts the process to develop initial schedules and maintain schedules during the life of the project.

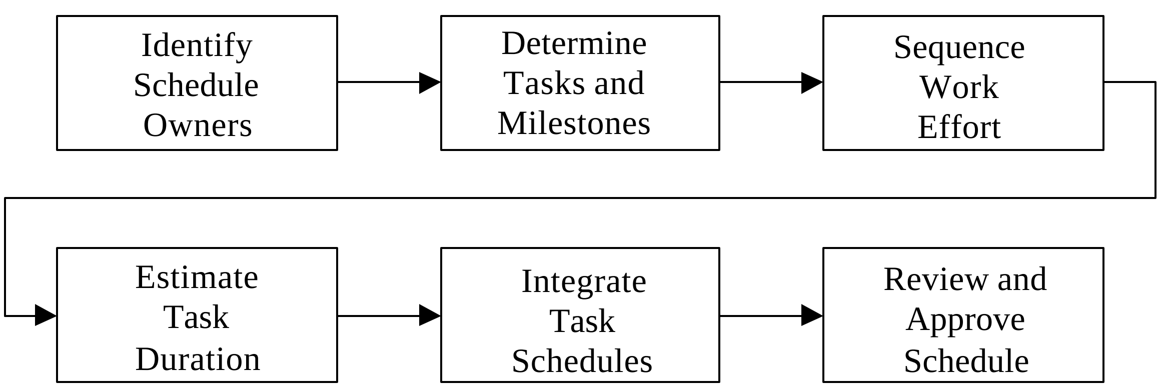

Figure 3.25
Schedule Development and Maintenance Process

Project Schedule Development

Identify Schedule Owners

Identifying the owners or individuals responsible for developing all or part of the project's schedule is essential to ensuring that good schedules are developed and maintained. It is recommended that a work breakdown structure and or organizational breakdown structure be used as the basis for schedule development because the WBS identifies scope and the Organizational Breakdown Structure identifies the functional area to deliver it. The schedule process will assume that a WBS is used. Where a WBS is not used, it is essential that responsibility to deliver project scope be assigned and that an individual be responsible for the appropriate schedule processes.

Determine Tasks and Milestones

For each lowest level WBS element, the tasks and milestones are identified to deliver the element. Tasks pertain to the effort to produce a product. Milestones pertain to a point in time and should be used as management checkpoints to measure accomplishment. The number of tasks and milestones identified should relate to what is known about the product, the level of risk, and the level of detail required of management. The result is a listing of tasks and milestones required to deliver the product. The flow diagram in Figure 3.26 provides an example of a training delivery plan.

The completion of key actions is important in all projects. These completions are denoted by milestones. A completion has no duration. For example, deliverables often are represented as milestones, while the effort to produce the deliverable is referred to as a "task".

While milestones are unique to each project, some common information technology project milestones are shown below:

- Requirements approval
- Phase review approval
- Prototype approval
- Design reviews completion
- Code reviews completion
- Unit test completion
- Integration test completion
- Acceptance test completion
- System acceptance by customer
- Customer shipment
- Documentation delivery

Milestones should be used to measure progress and as management checkpoints. Too often, progress on a given product is reported to be on schedule until the end. Then it is 25 percent complete and ten weeks behind schedule. By using milestones that truly measure performance and progress, this can be avoided. As an example, assume that the training plan for the project is critical. The list of tasks and milestones is shown in the following table:

Project Schedule Development

Description	Task/Milestone
Review training requirements	Task
Develop plan outline	Task
Customer review of outline	Milestone
Revise outline	Task
Outline approval	Task
Develop draft training plan	Task
Customer review of draft plan	Milestone
Revise draft training plan	Task
Training plan approval	Milestone

Milestones can occur at the end of each work package in the work breakdown structure and serve as a measurable item on which to base success of a task. Major project milestones should be summarized and included in the summary project schedule.

For contracted work, milestones are often used as a point in the project where interim payments might be made. If this approach is used, mutual agreement is necessary on the content of each milestone and the cost associated with that milestone.

Sequence Work Effort

After the tasks and milestones to deliver a product are determined, they should be logically sequenced to reflect the way the work will be performed. Sequencing establishes the dependencies among the tasks and milestones and is used to calculate the schedule to deliver the product. The result of sequencing the example above is displayed in the Figure 3.26.

Precedence Relationship Types

- Finish-to-start – The *initiation* of the work of the successor activity/task depends upon the *completion* of the work of the predecessor activity/task.
- Finish-to-finish – The *completion* of the work of the successor activity/task depends upon the *completion* of the work of the predecessor activity/task.
- Start-to-start – The *initiation* of the work of the successor activity/task depends upon the initiation of the work of the *predecessor* activity/task.
- Start-to-finish – The *completion* of the successor activity/task is dependent upon the *initiation* of the predecessor activity/task.

The most common type of precedence relationship is finish-to-start, as shown in Figure 3.26, shown below.

Any of the defined dependencies may require specifying a lead or a lag to accurately define the relationship between two activities/tasks. A "lead" is a modification to a dependency relationship which allows an acceleration of the successor activity/task. A "lag" is a modification to a dependency relationship which directs a delay in the successor activity/task. For example, in a finish-to-start dependency with a five day lag, the successor activity/task cannot start until five days after the predecessor has finished.

Project Schedule Development

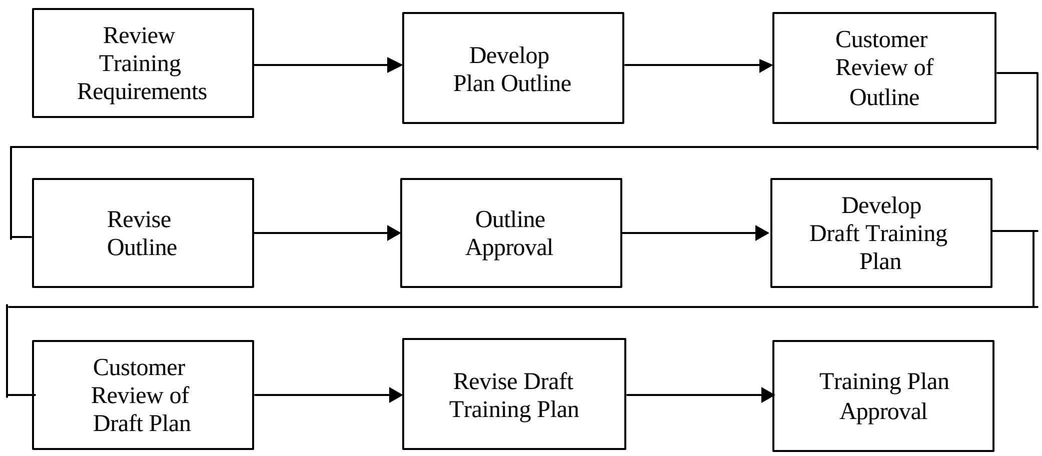

Figure 3.26
Work Effort Sequencing Example

Estimate Task Durations

Estimating task duration is one of the most challenging aspects of project planning. It is also a key to later cost estimation. This is a refined process that occurs throughout the planning process, as it is directly affected by results of staffing and costing activities.

Accurate task duration estimates are defined in order to stabilize customer relations, maintain team morale, and as a necessary planning tool. With defined task durations, the team knows what to expect and what is expected of it. Task duration is rarely overestimated, but is frequently underestimated. Inaccurate estimates can result in an increase in the "frenzy level" of a project. The frenzy escalates as sponsors scramble for more money or the technical staff scrambles to complete a project in an unrealistic time frame. Often, the end result is cutting corners, excessive overtime, and a dissatisfied customer.

The estimation process is complex because activity duration is affected by numerous variables that must be dealt with concurrently in the Planning Phase. Some of these variables include staff availability, the skill level of the person assigned to the task, unexpected events, efficiency of work time, and mistakes and misunderstandings during the execution of the project.

When estimating the duration of a task, reality is a major factor. The knowledgeable scheduler takes into account absenteeism, holidays, meetings, discussions, and interaction among the staff. No one is 100 percent productive every hour of the workday. If a scheduled task assumes 100 percent productivity, the schedule rapidly falls apart. A successful schedule builds these types of factors into the duration estimates. An industry accepted rule of thumb for estimating staff productivity is that an employee spends 80 percent of their time on productive tasks, while the remaining 20 percent accounts for staff meetings, stretch breaks, shifting from one productive task to another, etc.

There are several techniques that support task duration estimation. The most common technique is based on the historical experience of a similar scope of work performed by the estimator. Collected and archived historical project data are used successfully by many organizations to achieve quality performance on project deliveries.

Historical records greatly support both the duration and the cost estimations, which are so important in this phase. Data based on staff skills are far more valuable than generalized industry estimates. If historical data do not exist, seek the advice of experts and others who have completed similar tasks. It is also good practice to consult the individuals who may be performing the activities/tasks for duration estimation.

When historical data or experts are not available, use a technique of getting estimates from multiple sources, comparing results, and estimating the duration based on multiple inputs. The success of this method is predicated on finding good sources for providing the estimates.

The duration of tasks (e.g., year, month, week, day, or hour) should be consistent with the amount of detail tracked and the risk. Often tasks become so detailed that they are really a checklist of items. In a complex, lengthy project, checklists and schedules should be separated to ensure that the management benefits of each are achieved.

Integrate Task Schedules

Once the tasks and milestones are identified, sequenced, and have a planned duration, a schedule exists to deliver each product. Without integration, schedules are independent of each other and therefore may not depict timing issues related to the entire project. Individuals need to understand dependencies between each schedule. Integrating individual schedules provides a more accurate schedule and improves coordination between functional areas.

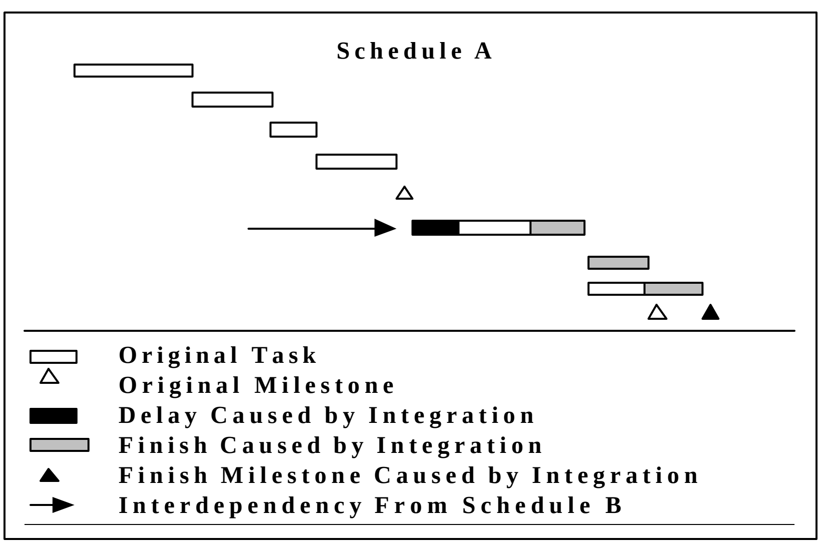

Figure 3.27
Schedule Integration Example

Project Schedule Development

Meetings between schedule owners are conducted to understand, document, and capture the dependencies in the project schedule. The meetings should be held or the topic of dependencies discussed on a regular basis to ensure that the dependencies continue to reflect the current work effort. Figure 3.27 shows a schedule integration example.

In Figure 3.27, the dependency from Schedule B to Schedule A has caused a delay to a task. Because subsequent tasks have been sequenced in Schedule A, the delay trickles down to the final milestone. Owners of both schedules understand the impact on each schedule and can plan accordingly.

Review and Approve Schedule

The development of a large or complex schedule requires input from more than one person. No one possesses all the knowledge or understanding of all the factors that affect schedules in every aspect of a project. Schedule review also prompts buy-in to the schedule. Buy-in on the schedule by the people who will actually perform the work is critical to success of the project. Participation in scheduling gives the staff a stake in the outcome of the project. On the other hand, imposed schedules decrease the opportunity for successful completion.

Once an initial cut at the schedule is ready, a team should perform a review. The people named to do the work (and who did not participate in the initial estimates) should review the work descriptions and the schedule. Interview the people and determine if the work descriptions are complete and accurate.

Determine if there is a common understanding of what has to be done. Get their independent estimates as to how long it will take to do the job. Where there are significant differences between the current schedule and new estimates, determine the reasons and either redefine the work packages or review and iterate the schedule estimates.

The final steps in schedule development are reviewing the schedule to ensure that it portrays the current work effort and then approving the schedule. There may be various levels of review and approval, which should be documented in a schedule process. Usually, schedule owners will review the schedule until they are satisfied that it represents the most effective and efficient work effort; then they will approve it. Once approved by the owners, the schedule is reviewed and approved by mid-level managers, the project manager, and senior management.

SEE THE "OTHER HELPFUL HINTS FOR CREATING A PROJECT SCHEDULE" ON THE FOLLOWING PAGE TO HELP WITH FURTHER ACTIVITIES DURING THE SCHEDULE DEVELOPMENT OF THE PROJECT.

Schedule Baseline

A baseline is a set of agreed-upon data used for comparison. Therefore, a schedule baseline represents a set of schedule data used as a reference point to compare the current schedule performance against the reference point. The comparison allows for corrective action to ensure that the project remains on track. The baseline may be formal or informal. Although the process to create a schedule baseline is the same regardless of the formality,

Project Schedule Development

the baseline's intended use is different. A formal baseline is used to communicate externally and manage internally. An informal baseline is not communicated externally and provides a point of reference used internally by project team members.

The process to establish a schedule baseline consists of determining what data should be baselined, ensuring that the data have been established and recorded, and saving the data for future comparison.

Baselines may be created for a variety of reasons. The number of baselines captured and stored for historical information may vary from project to project. The following are examples of the types of baselines that may be established for a project:

- ***Original.*** Once a project schedule is established, reviewed, and approved, it can be baselined as the original schedule baseline. The original baseline should never be changed and should always represent the project schedule as it was first envisioned.
- ***Intermediate.*** The project team uses intermediate baselines as an informal method to compare schedule information. Typically, intermediate baselines are used to compare the current schedule against a schedule status from a given point in time, such as a previous cycle status.
- ***Revised.*** A revised baseline may be established to capture the project schedule based on an approved change in project direction. In essence, the original schedule baseline may no longer provide a realistic means to compare future schedule performance, so a new revised baseline is created.

If there may be significant differences between the current schedule and new estimates, determine the reasons and either redefine the work packages or review and iterate the schedule estimates.

Other Helpful Hints for Creating a Project Schedule

Templates and Historical Information
Use schedule templates or historical information as the basis for schedule development, if applicable. Historical information can provide invaluable insight regarding tasks that otherwise might be overlooked and estimates for resources and durations for an improved basis for the plan.

Use a Work Breakdown Structure
Because a WBS allows project participants to understand what they are delivering and a schedule describes how they will deliver it, a WBS is the logical starting point for developing a schedule. To ensure that management focuses on the delivery of products and services, the schedule should clearly relate to the WBS.

Take advantage of automated tools, including a database, to associate a WBS element to the schedule to deliver it. This will improve management visibility. Figures 3.28 and 3.29, on the following page, depict the relationship between the WBS and the schedule.

Figure 3.28 displays a WBS and two related schedules. The WBS contains two elements that represent two discrete products, which constitute the scope (the *what*) of the project. Two critical path method network schedules

Project Schedule Development

portray *how* each element will be delivered. The dashed arrow represents a dependency from a task in the 1.1 schedule to a task in the 1.2 schedule.

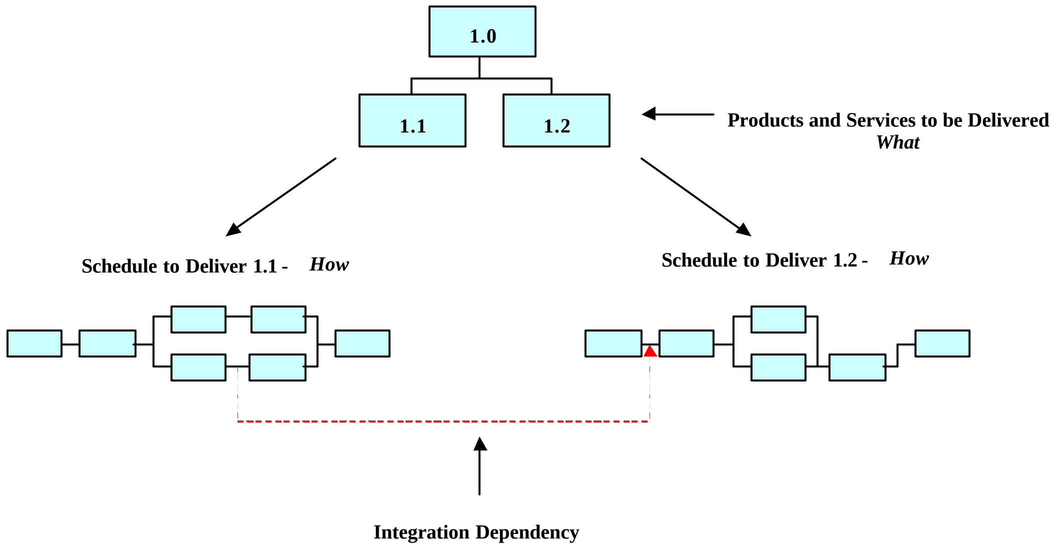

Figure 3.28
Work Breakdown Structure-Schedule Relationship

Figure 3.29 depicts the same relationship represented as a Gantt chart. Take note that the WBS code is repeated for the corresponding tasks. In that way, the tasks to deliver each WBS element are associated and can be understood.

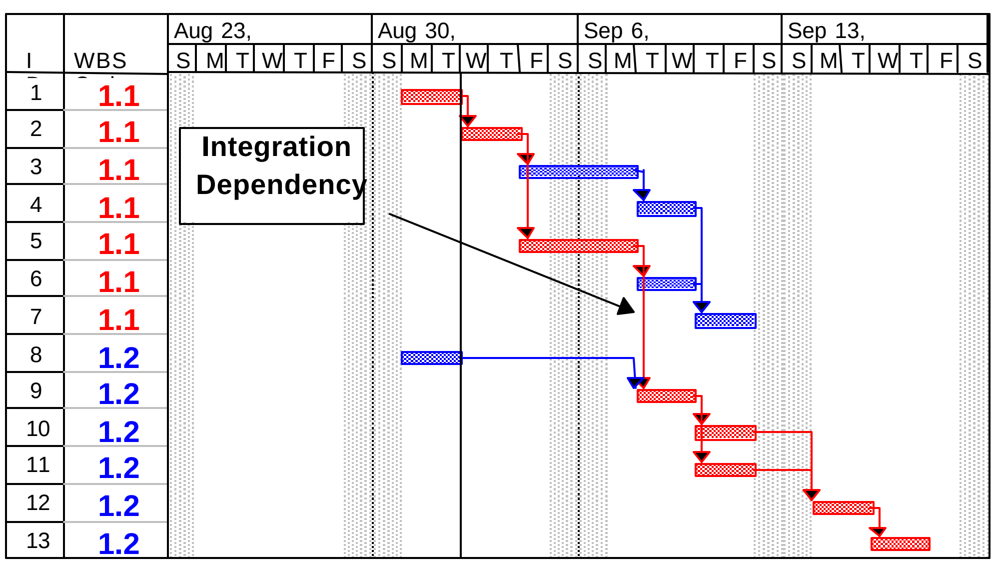

Figure 3.29
Work Breakdown Structure Gantt Chart Dependency Relationship

Project Schedule Development

Define Priorities

Clearly defining the task priorities helps to resolve any scheduling or resource conflicts. Understanding the priorities and relationships of the tasks assists in resolving difficult scheduling conflicts.

Define the Critical Path

The critical path is the largest path through a project. It determines the earliest possible completion of the work. The critical path must be carefully managed because if critical path tasks slip, the entire project is delayed. In order to manage the project, the schedule identifies the critical path and the project manager remains aware of its importance throughout the implementation of the project. Activities and tasks near the critical path should also be closely monitored, as they may easily be put on the critical path.

Document Assumptions

Documentation of the assumptions made in developing the project schedule is critical to the success of the project. Without clear documentation of these assumptions, later changes to the schedule are very difficult and risky.

If, for example, a schedule was shortened because it was assumed that a highly skilled person would be performing the work, that assumption should be documented. Then, if a less skilled person is actually assigned to perform the task, the project manager can recognize the risk and make necessary changes and decisions. Without documentation of the assumption, the schedule could be later placed in serious risk without the project manager realizing it.

Identify the Risks

Risks are inherently involved with scheduling limited resources. Good scheduling makes allowances for risks in one or more of the following ways:

- Where significant schedule risks are identified, add an additional WBS task for risk management/risk reduction, where financial reserves can be set aside to deal with potentially delayed schedules.
- Add additional time to those tasks where risks are inherent. There is no rule of thumb for this multiplier; it depends on the degree of risk and overall importance of the schedule to the project.
- Add a percentage time multiplier to the schedule for particular individuals, especially if new technology is being used or if the person providing the estimate is extremely optimistic. Technical staff often underestimates the time required to do any particular task.

Relationship to Other Management Information

Schedules can be related to other management information. For example, some milestones may relate to delivering a project deliverable. Many projects require deliverable tracking. By relating the schedules to deliverable tracking, improved information can be achieved through integration. Automated scheduling tools typically have customer defined fields that can assist in integrating schedule information to other management needs. The following are examples of possible associations:

- Tasks to phases
- Milestones to cost, revenue, and payment

Project Schedule Development

- Milestones to critical decision points
- Milestones to performance measures required for earned value
- Tasks to agencies or individuals
- Tasks and milestones to a business process

Level of Effort (LOE) Services

Level of effort is not scheduled. By definition, level of effort is a level of support. Support cannot usually be planned well in advance. This is not to say that products to support level of effort should not be planned. As an example, project control is an LOE service, and the automated system to support it is a product. A plan to implement the system should be developed. The subsequent project control support services need not be scheduled.

One Start—One Finish

One aspect of a useful schedule is its ability to provide management with a tool to understand the impact of an issue on the project schedule. To accomplish this, the tasks within the schedule must be constrained (have dependencies between them) so that impacts can trickle through the schedule and the issues' effects can be seen. Therefore, it is best that a schedule has only one task that starts the schedule; for example, "begin project."

All other tasks are then constrained to the first task or subsequent ones. The schedule should have only one task that completes the schedule; for example, "project complete." No task should be entered into the schedule without affecting something or being affected. The constraints or dependencies should be realistic. Many times it may be difficult to understand what a particular task is dependent upon. However, the task's dependency and impact are always there or it should not be tracked in the schedule.

Descriptions

Schedules are displayed to many different people within and outside the project. All potential recipients of schedule information should understand the descriptions of tasks and milestones, which should be as clear as possible. Cryptic or abbreviated descriptions should be avoided. Communication is the key.

Labor Resource Availability

Knowledge of what labor resources may be available, and at what times, and in what patterns, is necessary for schedule development. The amount of detail and the level of specificity in the available labor resource pool description may vary. For example, for schedule development purposes, one need only know that two database administrators are available in a particular time frame, not necessarily who the particular individuals are.

Summary Tasks

A group of tasks can usually be combined to represent some aspect of the project that is important to management; for example, the schedule to deliver a WBS element or a particular phase of the project. Automated scheduling tools have the capability to define summary tasks, often referred to as "hammocks", which enable tasks to be grouped. Task grouping improves communication and provides a framework to display summary information to upper management.

Project Schedule Development

Management Concurrence
Usually the project manager and technical representatives of the project develop the schedule. However, management is typically the prime recipient of schedule benefits. Therefore, all levels up to the project manager should understand the schedule. Management must concur with, own, and use the schedule as a tool to manage the project. Without management ownership, project performance may be less than optimal.

Simplicity
Developing and maintaining project schedules is difficult and time-consuming. Frequently, schedules are developed and never maintained to reflect current status. This may be because of a lack of discipline or the time-consuming process inherent to scheduling. Additionally, risk should be a factor when determining the degree of rigor required for project schedules. Areas with a high degree of risk may require a greater degree of schedule control. Areas with a low degree may not require the same rigor.

Simplicity may be the best approach. Schedules should be developed to enable project participants to understand the delivery of the entire project. First developing schedules at a high level and then defining detailed schedules for high risk areas should satisfy the need for improved control with reduced burden.

Automation
Schedules provide invaluable information to the management of a project. Automation can offer the means to improve reporting to management. Automated scheduling tools are commonplace in today's project environments. The State of Michigan has adopted the Niku Portfolio Manager Suite and Microsoft Project for this purpose. However, integrating schedule information with other project information can provide additional capability that schedules alone cannot.

Risk Planning

Project Risk Planning Introduction

A risk is any factor that may potentially interfere with successful completion of the project. A risk is not a problem—a problem has already occurred; a risk is the recognition that a problem or opportunity might occur. By recognizing potential problems, the project manager can attempt to avoid or minimize a problem through proper actions.

The relationship of risk planning to the rest of the Planning Phase components is shown in Figure 3.30.

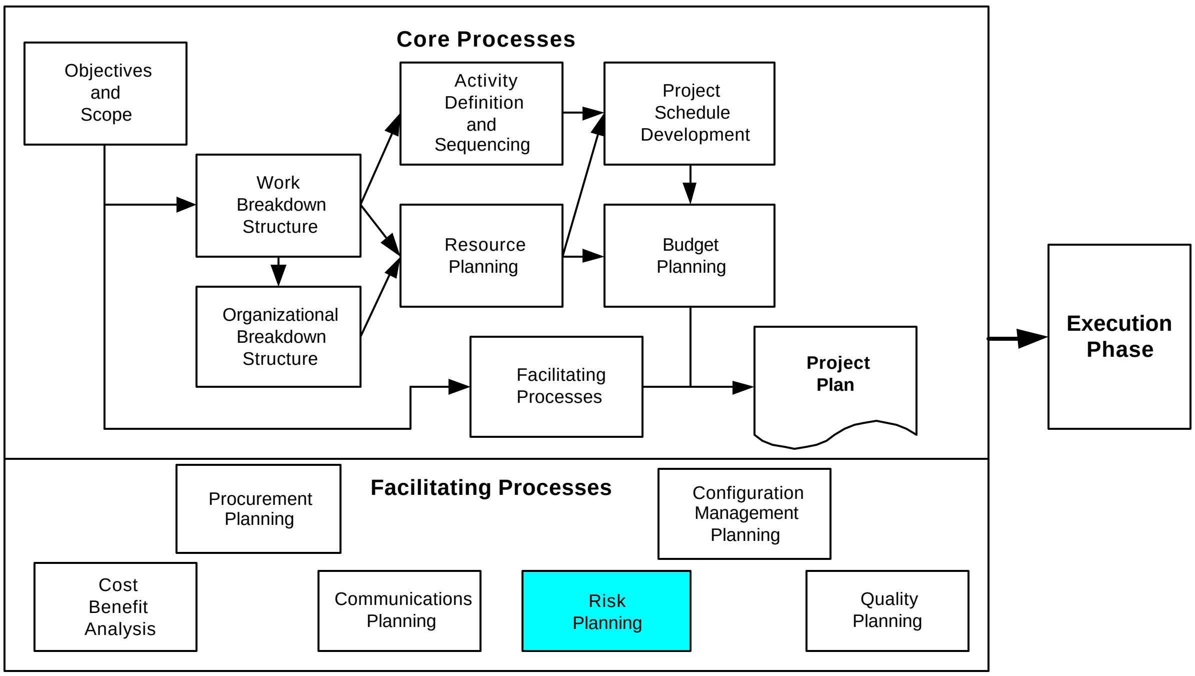

Figure 3.30
Risk Planning Identified in the Planning Processes

The procedure that the team will use to manage project risks is defined in the Planning Phase, documented in the Project Plan, and then executed throughout the Execution Phase of the project.

A Powerpoint presentation is available on the Office of Project Management's website (www.state.mi.us/cio/opm), in the PM Methodology section – which explains, in layperson's terms, what Risk Management is and what value it adds to the project. This presentation can be used to explain project risk management to your project team.

The Risk Management Plan, shown at the end of this subsection, documents the parameters used to manage risk throughout the project. In addition to documenting the results of the risk identification and analysis steps, it must cover who is responsible for managing various areas of risk, how risks will be tracked throughout the project, how contingency plans will be implemented, and how project contingency reserves will be allocated to handle risk.

Project reserves are resources (people, dollars, and commodities) that are available to the project if needed. Reserves can come in two types --

contingency reserves (known unknowns) and management reserves (unknown unknowns). Contingency reserves are developed based on the results of risk planning, and are usually available for release at the project manager's discretion to address risks that materialize, and to ensure the project succeeds even if the risk occurs. Management reserves are developed at the discretion of management, and are put in place when the ability to obtain additional budget may compromise the success of the project. Management reserves are typically part of project budgeting, and not part of risk planning.

Project risks are identified, monitored and carefully managed throughout the life of the project. It is particularly important in the Planning Phase to document risks and identify contingency reserves that have been applied to the risks.

There are various areas that can affect a project's risk level:

- The technology used on the project
- The environment in which the project is executed
- The relationships between team members
- How well the project fits the culture or business area or strategic objectives of the agency
- How great of a change will result from the project

<u>Documenting Risks</u>

Risks are documented so that contingency measures can be taken to mitigate their effects. Risks to both the internal and external aspects of the project should be tracked. Internal risks are those items that the project team can directly control (e.g., staffing), and external risks are those events that happen outside the direct influence of the project team (e.g., legislative action).

As stated before, risk identification begins early in the Planning Phase of the project. A Risk Management Plan is started during the Planning Phase. Then, as scheduling, budgeting, and resource planning occur, the plan is updated to reflect further risks identified throughout the Planning Phase. The Risk Management Plan template can be found at the end of this subsection and in Appendix B.

Just prior to the Project Execution Phase, the Risk Management Plan should be reviewed again, and any new risks should be added to it. As the project progresses, members of the team identify new risk areas that are added to the Risk Management Plan. Also, during the Project Control Phase (concurrently with the Project Planning and Project Execution Phases), risks identified earlier may be removed.

<u>Contingency Planning</u>

Contingency plans are developed as a result of a risk being identified. Contingency plans are predefined action plans that can be implemented if identified risks actually occur. If a risk event actually occurs, the contingency plan may need to be implemented and contingency reserves allocated, depending on the risk's impact.

As a guideline, contingency plans may initially be developed for the top five risks associated with a project, but don't forget to monitor the remaining identified risks further into the project. For large projects, the top five risks of each major subsystem may be actively tracked. To properly implement a contingency plan, a contingency reserve is usually required where dollars and/or time are held by the project manager to apply to the execution of a contingency plan. Without maintaining a contingency reserve, the project manager is forced to go back for additional time or dollars for every risk as it becomes a problem. It is far more desirable to maintain a level of contingency reserve where problems can be dealt with from within the original budget and schedule of the project.

There are some situations where nothing can realistically be done to prevent or deal with a risk. In this case, the project must be managed in such a way that the probability of the event occurring is minimized. If the event does occur, the project manager must re-plan the project and include the effect of the risk event.

The Risk Management Process

Risk management, as defined in the Project Management Institute's *Project Management Book Of Knowledge (PMBOK®) 2000 Edition*, separates risk management into the following six major processes:

- Risk Management Planning
- Risk Identification
- Qualitative Risk Analysis
- Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control

The State of Michigan's Project Management Methodology groups these processes into the following process steps:

- Step 1: Risk Management Strategy Development
- Step 2: Risk Identification
- Step 3: Qualitative and Quantitative Risk Analysis
- Step 4: Risk Response Planning
- Step 5: Risk Monitoring and Control, which is part of the Execution and Control Phases, and will be discussed later in this Methodology.

The sequence of activities of the Project Risk Planning process is depicted in Figure 3.31 below.

The Risk Management Plan Template, shown at the end of this section, encompasses steps 1 through 4 of the Project Risk Management Process.

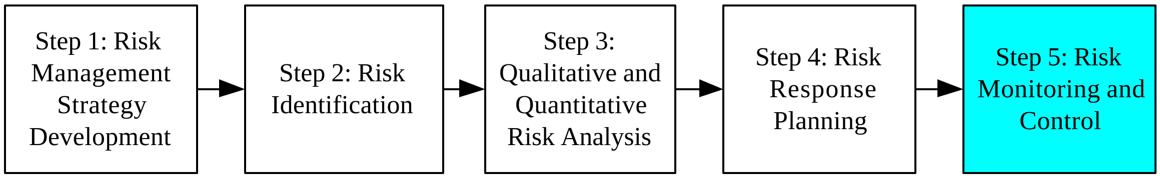

Figure 3.31
Project Risk Management Process

Step 1: Risk Management Strategy Development

Risk management strategy development is the process of deciding how to approach and plan the risk management activities for a project. Risk management strategy development involves the creation of the various components and strategies for the Risk Management Plan. In step 1 of the risk planning process (Risk Management Strategy Development), the Risk Management Plan can be viewed as a high level planning document. By the end of step 4 of the risk planning process (Risk Response Planning), the Risk Management Plan is a detailed, action-oriented document to be used in Risk Monitoring and Control, found in the Project Execution and Control Phases of this Methodology.

It is important to plan for the risk management process to ensure that the level, type, and visibility of risk management are commensurate with both the risk and importance of the project to the organization.

The Risk Management Plan describes the development of the structure and implementation of risk identification, qualitative and quantitative risk analysis, risk response planning, and risk monitoring and control during the project life cycle.

Risk Management Plan Elements
The Risk Management Plan may include the following components:

- ***General Project Information.*** Identifies the general project parameters, as will all PM Methodology templates.
- ***Risk Management Strategy:***
  - ***Risk Management Methodology.*** Defines the approaches, tools, and data sources used to perform risk management on this project. Different types of assessments may be appropriate, depending upon the project stage, amount of information available, and flexibility remaining in risk management.
  - ***Risk Assumptions***. Defines any initial risk assumptions that are known at the current time. Include any risk factors standard to the performing organization.
  - ***Risk Management Roles and Responsibilities***. Defines the lead, support, and risk management team membership for each type of action in the Risk Management Plan. Risk management teams organized outside of the project office may be able to perform more independent, unbiased risk analyses of project than those from the sponsoring project team.
  - ***Risk Management Timeframes***. Defines the frequency and

duration of the risk management process, and when it will be performed throughout the project life cycle. Results should be developed early enough to affect decisions. The decisions should be revisited periodically during project execution.

- ***Risk Ranking/Scoring Techniques***. The ranking/scoring methods appropriate for the type and timing of the qualitative and quantitative risk analysis being performed. Methods and scoring of the various risk components must be determined in advance to ensure consistency.
- ***Risk Thresholds***. The threshold criteria for risks that will be acted upon, by whom, and in what manner. The project manager, customer, and sponsor may have a different risk threshold.
- ***Risk Communications.*** Defines how the results of the risk management processes will be documented, analyzed, and communicated to the project team, internal and external stakeholders, sponsors, and others.
- ***Risk Tracking***. Documents how all facets of risk activities will be recorded for the benefit of the current project, future needs, and lessons learned. Documents if and how risk processes will be audited.

- ***Identification of Project Risks***. Risk identification involves determining which risks might affect the project and documenting their characteristics.
- ***Detailed Qualitative and Quantitative Analyses.*** This area includes identified project risk probabilities and impacts. The process of assessing the impact and likelihood of identified risks. This includes results from qualitative and quantitative analyses.
- ***Risk Response Planning.*** The process of developing options and determining actions to enhance opportunities and reduce threats to the project's objectives. This process ensures that identified risks are properly addressed. The effectiveness of response planning will directly determine whether risk increases or decreases for the project.

Developing the Risk Management Strategy

Inputs to develop the Risk Management Strategy section of the Risk Management Plan include the following:

- The Project Charter
- Any available organization specific risk management policies and procedures
- Roles and responsibilities matrix from the Project Charter
- The Work Breakdown Structure for the project
- Any predefined risk templates (including and predefined risk categories)
- Any key stakeholders risk tolerances that are identifiable
- Project Type – Projects using state-of-the-art or first-of-its-kind technology or highly complex projects, tend to have more uncertainty

Risk Management Strategy development is accomplished through planning meetings. Meeting attendees include the project manager, the project team leaders, anyone in the organization with responsibility to manage the risk planning and execution activities, key stakeholders, and others, as needed. Meeting attendees utilize the above inputs to help develop the Risk

Risk Planning

Management Strategy.

Step 2: Risk Identification

Who Identifies Risk

Risk identification is the responsibility of all members of the project team. The project manager is responsible for tracking risks and for developing contingency plans that address the risks identified by the team. Sometimes a risk identification brainstorming session can help in the initial identification process. Such meetings help team members understand various perspectives and can help the team better understand the big picture.

Risk identification involves determining which risks might affect the project and documenting their characteristics. Participants in risk identification generally include as many of the following as possible: project team, risk management team, subject matter experts from other parts of the organization, customers, end users, other project managers, stakeholders, and outside experts.

Risk identification is an iterative process. The first iteration may be performed by a part of the project team, or by the risk management team. The entire project team and primary stakeholders may make a second iteration. To achieve an unbiased analysis, persons who are not involved in the project may perform the final iteration. Often, simple and effective risk responses can be developed and even implemented as soon as the risk is identified.

When To Perform Risk Identification

Risk identification is a recurring event; it is not performed once and then set aside. The risk identification process begins in the Project Initiation Phase, when initial risk areas are identified. During the Planning Phase, risks and mitigation measures are identified and documented. During the resource allocation, scheduling, and budgeting processes, associated risk planning is also documented. Risk identification, management, and mitigation continues after the Project Initiation Phase throughout the life of the project. New risks develop as the project matures and external and internal situations change.

When the probability of a risk event increases or when a risk becomes a reality and the project manager must deal with a real problem, re-planning occurs. At this point, the project manager and project team develop strategies that assess the impact of the risk event. This re-planning results in budget, schedule, or resource changes for completion of the project.

Risk Categories

Risks that may affect the project for better or worse can be identified and should be organized into high level categories. These categories should be well defined and should reflect common sources of risk for the business or application area. Sample categories include:

- **Technical, quality, or performance risks.** Examples include reliance on unproven or complex technology, unrealistic performance goals, changes to the technology used, and changes to industry standards during the project. Include an assessment of the customer's involvement in the definition of the product specifications, and the potential for these requirements to change.
- **Project schedule risks.** Examples include an assessment of the project

team to meet key deliverable dates, and project duration accuracy.

- **Project management risks.** Examples include poor allocation of time and resources, inadequate quality of the project plan, lack of project manager delegated authority, and use of project management disciplines.
- **Organizational risks.** Examples include cost, time, and scope objectives that are internally inconsistent, lack of prioritization of projects, inadequacy or interruption of funding, and resource conflicts with other projects in the organization.
- **External risks.** Examples include a shifting legal or regulatory environment, labor issues, changing customer priorities, local- state- or country-based risks, and weather. Also to be looked at in this area are vendor contract risks, including contractor relationships, type of contract, and contractor responsibilities in case of under-performance of project deliverables.

How to Identify Risk

Risk can be identified through a variety of means:

- **Project deliverable descriptions and specifications.** Risk is inherent in any new project, often because the product or process being created is completely new. In situations such as this, it is wise to look at the product descriptions and specifications to determine if there are any areas that have the potential for risk.
- **Project documents**. Reviewing documents such as the Project Charter, work breakdown structure, budget estimates, staffing plans, assumptions and constraints, etc., may bring to light areas of risks that were not immediately apparent at the time of creation.
- **Subject matter expert interviews.** Talking to people who have been on similar projects or looking through historical project files should give the project manager an indication of where risk may lie. Talking to individuals who have "been around," especially in a highly charged political environment, can be extremely beneficial.
- **Brainstorming sessions.** Getting key stakeholders and project team members together into a room and documenting thoughts, free of immediate criticism, has the potential to generate ideas. These ideas can then be categorized and evaluated. A variation of brainstorming is the "Crawford Slip," which involves the use of yellow sticky notes for risk identification and categorization.
- **Analogy comparisons.** Examining lessons learned from similar projects can help identify potential risk areas for the project at hand. Projects performed at your agency will most likely be the more relevant than examining a project database from another organization.

Step 3: Qualitative and Quantitative Risk Analysis

Qualitative risk analysis is the process of assessing each risk priority, its likelihood of occurrence and potential impact to the project, and should be performed for all identified risks. Quantitative risk analysis is the process of analyzing *numerically* the probability of each risk and its likely occurrence. Quantitative risk analysis is normally performed after qualitative risk analysis. Quantitative risk analysis should be performed for identified risks that require *precise* probability and impact measures; risks where the quantitative data is readily available; risks associated with large scale projects requiring such data, or for risks identified on projects that are predetermined to be of high risk.

QUALITATIVE RISK ANALYSIS

The qualitative risk analysis process prioritizes risks according to their potential effect on project objectives. Qualitative risk analysis is one way to determine the importance of addressing specific risks and guiding risk responses. The time criticality of risk-related actions may magnify the importance of a risk.

Qualitative risk analysis requires that the probability and consequences of the risks be evaluated using established qualitative analysis methods and tools. Qualitative risk analysis should be revisited during the project's life cycle to stay current with changes in the project risks. This process can lead to further analysis in quantitative risk analysis or directly to the risk response planning step.

Inputs to qualitative risk analysis include the risk management planning information developed in step 1, which includes project complexity and technology maturity, data precision techniques, measurement scales, organizational risk factors, and risk assumptions. The potential project risks identified in step 2 and any other pertinent information that would help in the qualitative risk analysis process are also inputs.

Tools and techniques for performing qualitative risk analysis include the following:

Probability/impact matrix. A matrix is constructed that assigns risk ratings (very low, low, moderate, high, and very high) to risks or conditions based on combining probability and impact scales. Risks with high probability and high impact are likely to require further analysis, including quantification, and aggressive risk management. The risk rating is accomplished using a matrix and risk scales for each risk.

A risk's *probability scale* may be defined to fall between 0.0 (no probability) and 1.0 (certainty), or any other scale that is used consistently across all risk factors. Assessing risk probability may be difficult because expert judgment is used, often without benefit of historical data. An ordinal scale, representing relative probability values from very unlikely to almost certain, can be used as well.

Qualitative risk analysis can produce the following results/outputs:

An overall risk ranking for the project. Risk ranking may indicate the overall risk position of a project relative to other projects by comparing the risk scores. This rating can be used to assign personnel or other resources to projects with different risk rankings, to make a cost-benefit analysis decision about the project, or to support a recommendation for project initiation, continuation, or cancellation.

Prioritized risks. Risks and conditions can be prioritized by a number of criteria. These include rank (very low, low, moderate, high, and very high) or work breakdown structure level, such as Phase, Activity, and Task. Risks may also be grouped by those risks that require immediate attention and those that can be handled in a later part of the project.

QUANTITATIVE RISK ANALYSIS

The quantitative risk analysis process aims to analyze *numerically* the probability of each risk and its consequence on project objectives. As stated above, quantitative risk analysis should be performed after qualitative risk analysis. Quantitative risk analysis should be performed for identified risks that require *precise* probability and impact measures; risks where the quantitative data is readily available; risks associated with large scale projects requiring such data, or for risks identified on projects that are predetermined to be of high risk.

Quantitative risk analysis uses techniques such as Monte Carlo simulation and decision analysis to:

- Determine the probability of achieving a specific project objective
- Quantify the risk exposure for the project, and determine the size of cost and schedule contingency reserves that may be needed
- Identify risks requiring the most attention by quantifying their relative contribution to project risk, via a risk rating
- Identify realistic and achievable cost, schedule, or scope targets

In order to quantify risks, a quantitative value must be assigned to each weighting factor. One such scale may use the following:

- Very low = 10 percent (.1)
- Low = 30 percent (.3)
- Moderate = 50 percent (.5)
- High = 70 percent (.7)
- Very high = 90 percent (.9)

Examples of software development risk factors

Project Size:
Low = less than 10,000 lines of source code
Medium = 10,000 to 100,000 lines of source code
High = more than 100,000 lines of source code

Project Effort:
Low = less than 1 person year
Medium = 1 to 10 person years
High = more than 10 person years

Project Cost:
Low = less than $100,000
Medium = $100,000 to $1,000,000
High = more than $1,000,000

Inputs to quantitative risk analysis include the risk management planning information developed in step 1, which includes project complexity and technology maturity, data precision techniques, measurement scales, organizational risk factors, and risk assumptions. The potential project risks identified in step 2, the qualitative risk analysis outputs derived above, and any other pertinent information that would help in the quantitative risk analysis process are also inputs.

Risk Planning

Quantifying Risk Factors
Interviewing techniques are used to help quantify the probability and consequences of risks on project objectives. An interview with project stakeholders and subject matter experts may be the first step in quantifying risks. The information needed depends upon the type of probability distributions that will be used.

Documenting the justification of the risk ranges is an important component of the risk analysis because it can lead to effective strategies for risk response in the risk response planning process.

Additional methods for quantifying risk include:
Sensitivity analysis. Sensitivity analysis helps to determine which risks have the most potential impact on the project. Sensitivity analysis examines the extent to which the uncertainty of each project element affects the objective being examined when all other uncertain elements are held at their baseline values.

Decision analysis. A decision analysis is usually represented in the form of a decision tree. The decision tree is a diagram that describes a decision under consideration and the implications of choosing one of the available alternatives. It incorporates probabilities of risks and the costs or rewards of each logical path of events and future decisions. Solving the decision tree indicates which decision yields the greatest expected value to the decision maker when all the uncertain implications, costs, rewards, and subsequent decisions are quantified.

Figure 3.32 depicts a decision tree. In order to make this decision correctly, one must determine whether it is more important to arrive on time or to travel economically. In this example, the decision to fly results in an expected value of $410 (-$300 + (.85 X $800) + (.15 X $200), while the decision to drive results in an expected value of $500 (-$150 + (.75 X $800) + (.25 X $200). In this case, the decision to drive would be made, baring other factors.

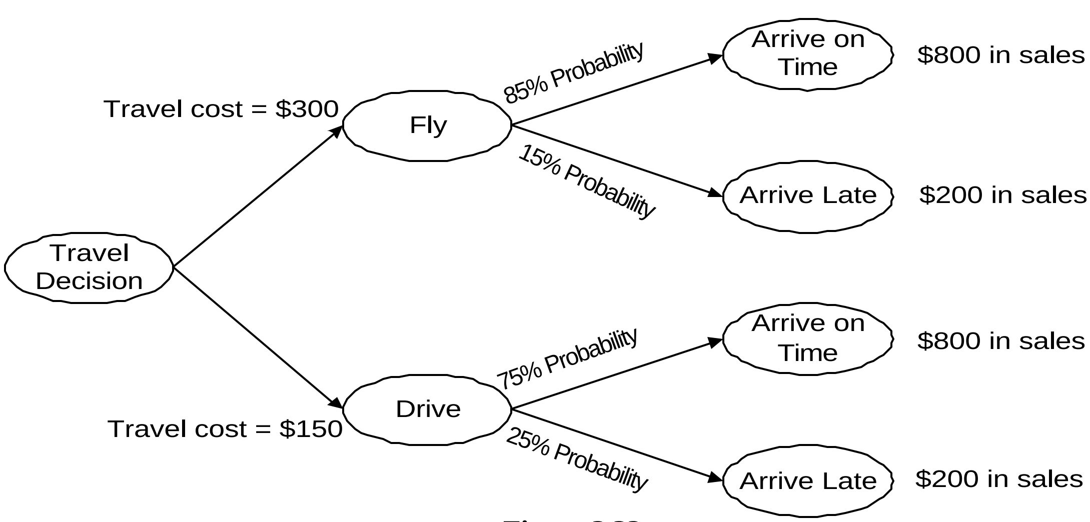

Figure 3.32
Decision Tree Analysis

Risk Planning

Simulation. A project simulation is a technique to emulate a process. Simulation is usually conducted a number of times to understand the process better and to measure its outcomes under different situations. Project simulations are typically performed using the Monte Carlo technique. There are software tools on the market that perform Monte Carlo simulations, such as Risk Radar and @Risk.

Quantitative risk analysis can produce the following results/outputs:
A prioritized list of quantified risks. This list of risks includes those that pose the greatest threat to the project together with a measure of their impact. Figure 3.33 depicts the relationship between probability of occurrence and the anticipated impact of the occurrence. Risks can then be classified in categories, such as very high, high, moderate, low, and very low.

Probability of achieving the cost and time objectives. The probability of achieving the project objectives under the current plan and with the current knowledge of the risks facing the project can be estimated using quantitative risk.

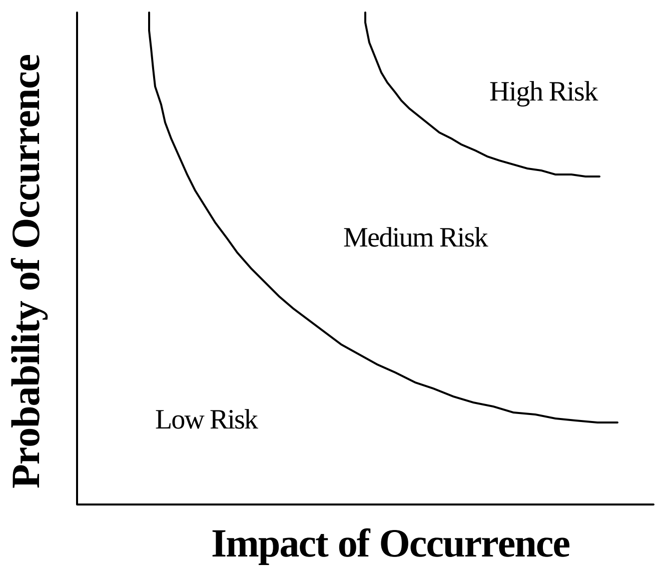

Figure 3.33
Relationship of Risk Probability to Risk Occurrence

Step 4: Risk Response Planning

Risk response planning is the process of developing options and determining actions to reduce threats to the project's objectives. Risk Response Planning includes the further identification and assignment of individuals or teams to take responsibility for each agreed upon risk response.

Risk response planning must be appropriate to the severity of the risk, cost effective in meeting the challenge, timely, realistic within the project context, agreed upon by all parties involved, and owned by a responsible person. Selecting the best risk response from several options is often required.

Inputs to risk response planning include the risk management planning information developed in step 1, including the level of risk that the organization will accept before taking action; the people and/or organizations that will take responsibility for the risk; and things and/or circumstances affecting/influencing multiple risks. Inputs to risk response planning also include potential project risks identified in step 2, the qualitative and quantitative risk analysis outputs identified in step 3, and any other pertinent information that would help in the risk response planning process.

Risk response strategies include:
Risk Avoidance. Risk avoidance is changing the project plan to eliminate the threat of a specific risk event. Although the project team can never eliminate all risk events, some specific risks may be avoided. Creativity is often required in order to come up with proper risk avoidance strategies.

Risk Transference/Deflection. Risk transfer/deflection is seeking to shift the consequence of a risk to a third party via a contract provision with a third party, through an insurance policy, or a vendor warranty. This third party also takes ownership of the risk response. It is important to note that transferring the risk to another party does not eliminate it.

Risk Mitigation. Mitigation is reducing the probability and/or the consequences of an adverse risk event to an acceptable threshold. It is commonly known that taking early action to reduce the probability of a risk occurring or its impact on the project is more effective than trying to repair the consequences after it has occurred. Mitigation costs should be appropriate, given the likely probability of the risk and its potential consequences.

Risk Acceptance. This is a risk response strategy that prepares for, and deals with, the consequences of a risk event – either actively (developing a contingency plan) or passively (accepting the consequences). There is no plan on the part of the team to take action on this risk.

Contingency Measures
The following represents a non-exhaustive list of mitigation strategies and/or contingency measures to consider when addressing project risk:

1. Provide appropriate training
2. Hire trained specialists
3. Install temporary hardware
4. Utilize internal hardware temporarily
5. Purchase additional equipment/facilities
6. Implement product functionality in a phased manner
7. Get agreement on who has decision authority; designate customer project coordinator
8. Locate project team in our offices
9. Negotiate better environment
10. Ensure that all the resources are provided
11. Suggest/sell functional specifications before development
12. Unilaterally develop functional specifications

Risk Planning

13. Adjust deadline and get Customer buy-off
14. Do not commit to third party performance
15. Get third-party commitment at least equal to (if not more than) commitment
16. Get customer commitment to participate in the project
17. Increase estimates for the related tasks
18. Do not commit to a resolution time unless absolutely necessary and then only if a study is done by knowledgeable persons
19. Establish access to product support personnel
20. Hold regular meetings with customer
21. Maintain constant written and oral communication with remote personnel
22. Visit remote sites as needed
23. Demonstrate incremental results
24. Divide staff into teams and assign team leaders
25. Dedicate management resources
26. Establish final authority of project manager
27. Use proven hardware for development if possible
28. Reduce functionality to meet deadline
29. Document assumptions and understandings and get customer sign-off before investing substantial resources
30. Design an alternate (contingent) solution strategy

Risk response planning can produce the following results/outputs:

Risk Responses within the Risk Management Plan. Each risk response should be written to the level of detail at which the actions will be taken. It should include some or all of the following:

- Identified risks, their descriptions, the area(s) of the project affected (e.g., work breakdown structure element), their causes, and how they may affect project objectives
- Risk roles and assigned responsibilities
- Results from the qualitative and quantitative risk analysis processes
- Agreed responses including avoidance, transference/deflection, mitigation, or acceptance for each risk in the risk response section of the plan
- The level of residual risk expected to be remaining after the strategy is implemented
- Specific actions to implement the chosen response strategy.
- Budget and times for responses
- Contingency plans and fallback plans for major risks

Contractual provisions. Contractual provisions may be specified to identify each party's responsibility for specific risks, should they occur, and for insurance, services, and other items as appropriate to avoid or mitigate threats.

Contingency reserves. The probabilistic analysis of the project and the risk

Risk Planning

thresholds help the project manager (or assigned risk manager) determine the amount of contingency needed to reduce the risk of overruns of project objectives to a level acceptable to the organization.

Inputs to the project plan. The results of the risk planning process must be incorporated into all areas of the project plan to ensure that agreed actions are implemented and monitored as part of the ongoing project.

Risk Management Plan Template

The Risk Management Plan Template can be found on the following page, as well as in Appendix B.

Risk Management Plan Template

State of Michigan
(Insert Agency Name Here)
Risk Management Plan

A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the proposed project and project participants.

Project Name:	______________	***Date:***	______________
Controlling Agency:	______________	***Modification Date:***	______________
Prepared by:	______________	***Authorized by:***	______________

B. Risk Management Strategy

Define the risk management methodology to be used, the risk assumptions, the roles and responsibilities, the timeframes, risk ranking/scoring techniques, establish risk thresholds, define risk communications, and develop a risk tracking process.

1. *Define the risk management methodology to be used*
2. *Define the risk assumptions*
3. *Define the roles and responsibilities*
4. *Define the timeframes*
5. *Define risk ranking/scoring techniques*
6. *Establish risk thresholds*
7. *Define risk communications*
8. *Define risk tracking process*

C. Risk Identification

Define the risk and the type of risk (personnel, equipment, customer, logistics, organization, or other).

Risk Management Plan Template

Risk Category	Risk Description

D. Qualitative and Quantitative Analysis

Qualitative Analysis includes assessing the impact of risk events and prioritizing risk in relation to effect on project objectives. Quantitative Analysis includes assessing the probability of risk event occurring, establishing consequences of impact on project objectives, and determine weighting of risk.

Qualitative Analysis

- *Assess the impact of each risk event*
- *Prioritize risk in relation to effect on project objectives*

Risk Category / Event	Risk Priority	Risk Impact Assessment

Quantitative Analysis (optional)

- *Assess the probability of the risk event occurring*
- *Establish consequences of impact on project objectives*
- *Determine weighting of each risk factor*

Risk Category / Event	Probability of Occurrence	Consequences of Impact	Risk Weighting (Probability * Impact)

Risk probability: .1 = Very Low / .3 = Low / .5 = Moderate / .7 = High / .9 = Very High

E. Risk Response Planning

Determine the options and actions to enhance opportunities and reduce threats to the project's objectives. Assign responsibilities for each agreed response.

Risk Category / Event	Risk Mitigation Outcomes	Actions Taken / To Be Taken	Risk Responses

Procurement Planning

Procurement Planning Defined

Procurement planning is the process in which the project manager identifies those needs of the project that can be met by purchasing products or services from outside the agency. Procurement planning deals with the following:

- What to procure
- When to procure
- How to procure
- How much to procure

The relationship of procurement planning to the rest of the Planning Phase components is shown in Figure 3.34.

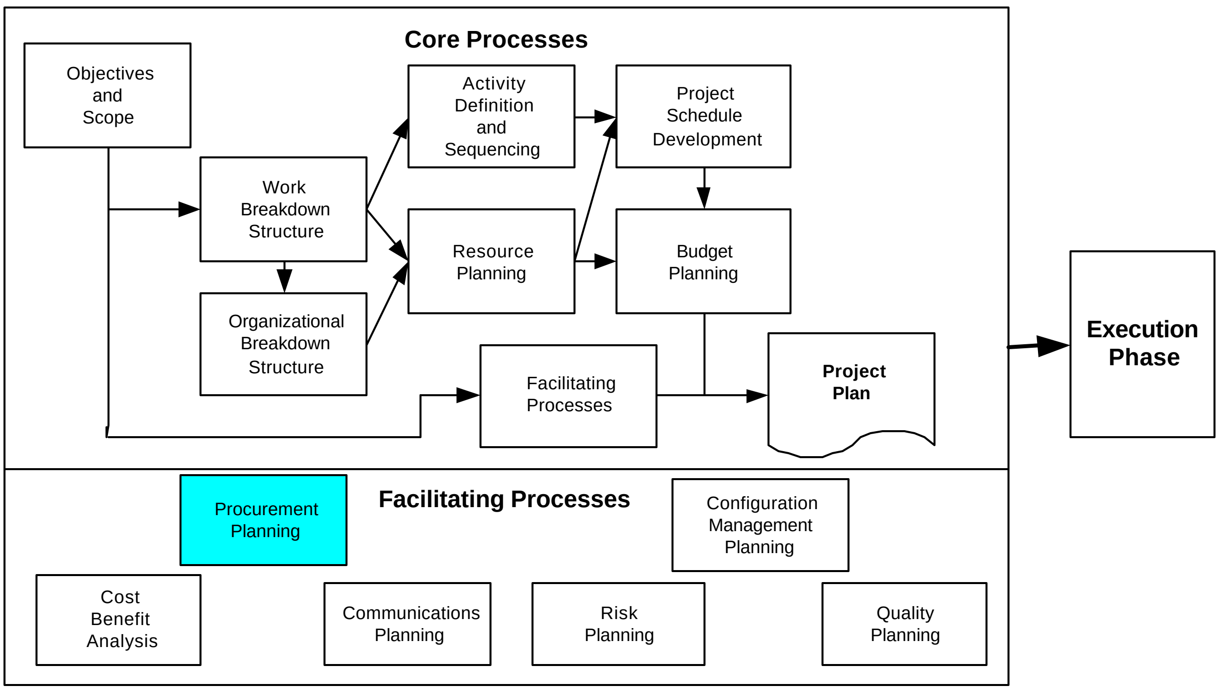

Figure 3.34
Procurement Planning Identified in the Planning Processes

What to Procure

It is very uncommon for an organization to be able to create or supply all the products necessary to complete a project internally. In those circumstances where it is necessary to go outside the agency, the response is to purchase the product or service from an external source or enter into a contract with an outside vendor to perform a service or develop the product for the agency. Whatever choice is made, there is definitely a considerable amount of forethought and planning that needs to go into such a decision.

First, the project manager and the project team must look at the needs of the project to determine what special consideration needs to be given to the project. Simple questions such as the following need to be answered:

- How does this product serve the needs of the project and the agency as a whole?

Procurement Planning

- Does the product or something similar already exist somewhere else within the agency?
- Is there a service provider available in the marketplace for this product?
- Does the agency have the means (staff, money, contract, etc.) to produce or to acquire the product?

To answer these questions, the project team must take the time to do an extensive investigation into the need and impact of procuring a new product or service.

When to Procure (Decision Tools)

Decision tools are helpful in making decisions regarding procurement within the agency. Decision tools within procurement planning are not necessarily tools in the automated sense but are specific processes designed to facilitate decision making.

Make or Buy Analysis
This is a simple method to determine the cost-effectiveness of creating a product in-house as compared to the cost of buying the product or having it produced outside the agency. All costs, both direct and indirect, should be considered when performing a make or buy analysis. The costs should then be compared with each other with consideration given to any compelling argument on either side by the project team. Consideration should also be given to the potential of leasing versus purchasing items. This could save money for the agency if cost is applied correctly against the useful life of the product or service supplied. Many of the decisions will be based on the length of need for the item or service as well as the overall cost.

Expert Judgment
This process uses the expertise of people from within and outside the agency who have knowledge or training in the area in question to determine what steps should be taken. These people review the needs and the costs and deliver their opinion for consideration in the procurement decision.

How to Procure (Contract Types)

If a decision is made to purchase an item or service from outside the agency, then another important decision is made to determine what type of contract should be used. The following are some common contract types:

- ***Fixed Price/Lump Sum Contract****.* This is a contract that involves paying a fixed, agreed-upon price for a well-defined product or service. Special consideration must be given to these contracts to ensure that the product is well defined to reduce risk to both the agency and the contractor.
- ***Cost Reimbursement Contract****.* This contract type refers to a reimbursement to the contractor for actual cost of producing the product or service. Costs within the contract are classified as direct (e.g., salaries to staff of the contractor) and indirect (e.g., salaries of corporate executives for the contractor). Indirect costs are normally based on a percentage of direct costs.
- ***Unit Price Contract****.* The contractor is paid a preset amount for each unit (e.g., $10 per widget produced) or unit of service (e.g., $50 per hour of service) produced. The contract equals the total value of all the units produced.

Procurement Planning

How Much to Procure

This question can only be answered according to the needs of the project itself. However, serious consideration must be given at this point to the following questions:

- Will there be need beyond the immediate project for this product?
- How much of the budget has been allocated for this product?
- Is the need for the product clearly defined enough for the agency to know exactly how much of the product will be needed?

Underestimating or overestimating the cost or quantity of an item can have a huge impact on the financial success or failure of a project. Caution should be used when entering into any contract without clearly defined needs and objectives.

The Procurement Plan

Typically, state agencies have a procurement or finance area that handles contracting and purchasing needs for agency staff. In most cases, there is a predefined documentation process for all contracts and outside procurements. Therefore, it may be unnecessary for small projects to create an original or independent Project Procurement Plan for each individual project. Simple reference to agency policy on procurement and contracting should be sufficient when referenced with in the Project Plan. It is still wise to provide a summary of this plan as an attachment to the Project Plan itself. However, keep in mind that there may be times in which peculiar circumstances arise within a project that may need to address specific contracting issues. In these cases it will be important to have a predefined Procurement Plan.

The Procurement Plan is the management tool that defines the process for the project manager to make decisions about the purchasing of products or services throughout the life of the project (from planning through closeout). The procurement plan may discuss issues that include but are in no way limited to the following:

- Defining in specific terms what items will be procured and under what conditions.
- Defining who within the agency will be allowed to enter into contract agreements.
- Defining what type of analysis will be used to determine make or buy decisions.
- Documenting what types of contracts will be used and what actions need to be taken to initiate a procurement.
- Providing the standards for documentation that will need to be initiated and maintained for each contract.

Solicitation Planning

Solicitation planning refers to the process and documentation that is needed to support obtaining bids or proposals from prospective contractors for services needed within the project. As stated previously, all state agencies should have a formalized and well-documented process for solicitation within their purchasing or finance area. State government solicitation is subject to stringent contracting laws and should be handled by trained professionals within the agency with the support of project team members.

Procurement Planning

Do not forget, however, that each project is a unique undertaking and, therefore, will require distinctly different procurement documents in reference to the actual technical and specified project needs. Project managers and their teams should be involved in the creation of these detailed requirements and specifications in bid or proposal information. The project manager should take responsibility to ensure that the documentation generated within the solicitation planning process accurately reflects the needs, goals, and objectives of the project. The project manager should also be involved with the creation of the evaluation criteria for potential bidders and ensure that the criteria are clear and understandable.

Format of the Procurement Plan

The project manager and team members should use the standard templates and documents used within their agency whenever procurement or solicitation is necessary. Creation of any original procurement or solicitation documents should be reviewed by officials within the purchasing, contracts, and legal departments in order to mitigate any potential exposure to risk. Relevant insight into the project procurement and solicitation process should be captured at an executive level by the project manager and attached to the Project Plan whenever possible.

Procurement Plan Template

The Procurement Plan Template can be found on the following page, as well as in Appendix B.

Procurement Planning Template

State of Michigan
(Insert Agency Name Here)
Procurement Plan

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Procurement Definition

Describe, in specific terms, what items will be procured and under what conditions.

C. Contract Responsibility

Define who within the agency will be allowed to enter into contract agreements.

Name:
Phone:
Responsibility:

D. Decision Criteria

Define what type of contracts will be used and what actions need to be taken to initiate procurement.

E. Contract Type

Document which types of contracts will be used and what actions need to be taken to initiate procurement.

F. Contract Standards

Provide the standards for documentation that will need to be initiated and maintained for each contract.

Quality Planning

Quality Planning

The quality management process is the application of quality theory, methods, and tools to focus on customer requirements and to manage work processes with the objective of achieving continuous improvements or radical redesign.

The relationship of quality planning to the rest of the Planning Phase components is shown in Figure 3.35.

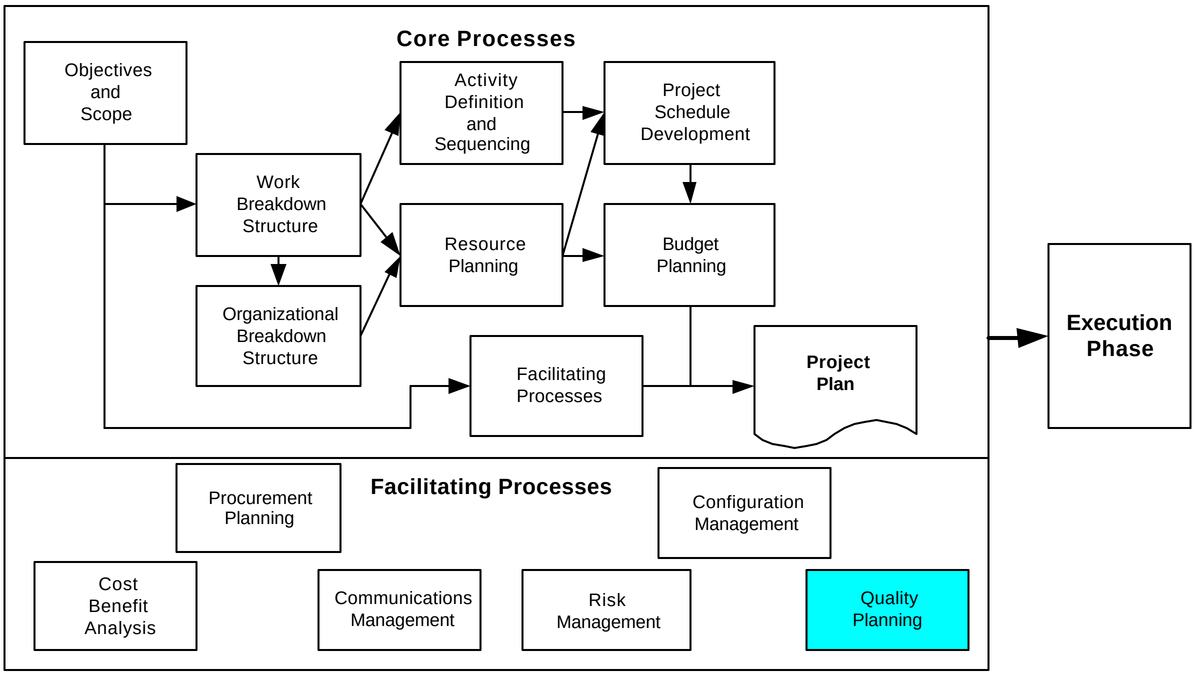

Figure 3.35
Quality Planning Identified in the Planning Processes

Quality Management

Quality management includes "all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality assurance, quality control, and quality improvement, within the quality system." [Project Management Body of Knowledge] Figure 3.36 depicts a high-level quality project management process.

Figure 3.36
Quality Project Management Process

Quality Planning

The purpose of using quality management is to improve products and services while achieving cost reductions throughout the project. Quality management requires broadening the scope of the quality concept to a systems approach. Many advocates of quality management will say that quality is an attitude or way of life that transforms the culture of an organization to one that emphasizes continuous quality improvement. Because the three processes depicted in Figure 3.36 interact with each other, as well as other processes within project management, quality management must be regarded as a system.

"Quality Planning" involves identifying which quality standards are relevant to the project and determining how to satisfy them. The activities within the quality planning process basically translate existing quality policy and standards into a Quality Plan through a variety of tools and techniques.

"Quality Assurance" is the evaluation of overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards. It utilizes quality audits to ensure that quality standards and customer requirements are met. This is further described in Section 4, the Project Execution Phase, of this methodology.

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance. This is further described in the Section 5, the Project Control Phase, of this methodology.

Successful quality processes always strive to see quality through the eyes of the customer. Customers are the ultimate judge of the quality of the product they receive. They will typically judge a project by whether or not their requirements are met. To ensure delivery of a quality product, the project team should ensure that requirements are addressed at each phase of the project.

It is important to include a process that validates that the currently defined requirements will be satisfactory to the customer. It is counterproductive to develop a system that meets a documented requirement if you and the customer know that the requirement has changed. The change management process helps to control the number of such changes, but quality processes must be in place in order to make changes when they are necessary.

Quality Tools and Techniques

There are four basic techniques used in quality management:

- Cost-Benefit Analysis
- Benchmarking
- Flowcharting
- Modeling

Cost-Benefit Analysis

Cost-benefit analysis involves estimating tangible and intangible costs and benefits of various project alternatives, and then using financial measures, such as return on investment or payback period, to assess the relative desirability of the identified alternatives. The quality planning process must consider cost-benefit trade-offs. “The primary benefit of meeting quality

Quality Planning

requirements is less rework, leading to higher productivity, lower costs, and increased stakeholder satisfaction. The primary cost of meeting quality requirements is the expense associated with project quality management activities; therefore, it is important for the benefits to outweigh the costs." [Project Management Body of Knowledge] See the Cost-Benefit Analysis subsection for more information.

Benchmarking

By using the benchmarking method, the quality manager and project team compare both actual and planned practices of the current project against other similar projects performed within the agency in the past. As long as the two projects have comparable processes with measurable results, the quality manager will be able to take a step toward determining the quality success of a project by comparing the two.

Flowcharting

Flowcharts are diagrams that graphically show how different elements of a system fit together in order to make clear the logical flow of data or processes. Examples of flowcharts include the following:

- Fishbone or Ishikawa Diagrams—these illustrate how various causes and sub-causes create or relate to process problems.
- System or Process Flowcharts (modeling)—these show how various elements of systems interrelate.

Modeling

Models are diagrams that describe details of procedures used for executing the tasks of projects. One such quality model can be seen in Figure 3.37 on the following page. Models should be based on standards and procedures that enable the quality manager to ensure quality during the project as follows:

- By enforcing quality standards and procedures through formal reviews, walkthroughs, and inspections.
- By tracking and reviewing defects at each phase of the project.

For large, lengthy, or complex projects requiring a unique Quality Plan, the model will define, track, and measure the project's quality goals. It is important for management to consider the quality goals early in the project and ensure that quality activities are integrated into the overall Project Management Plan. The Quality Plan is developed based on the quality procedures developed by the agency. These procedures address requirements that are specific to that state agency.

In short, these processes help team members determine where problems might occur so those problems can be fixed during the product creation rather than through rework.

Quality Planning

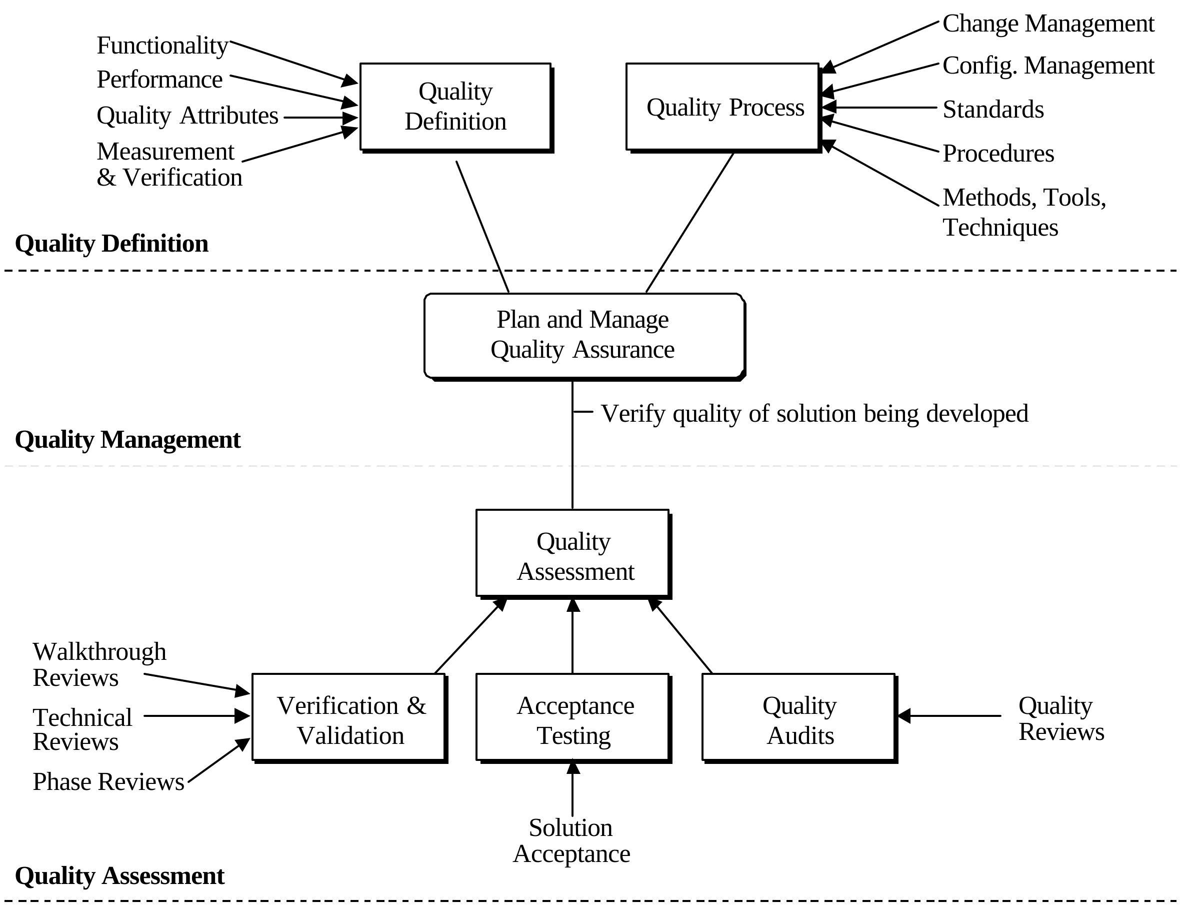

Figure 3.37
Quality Assurance Model

Responsibility for Quality

Every project member needs to buy in to the responsibility for producing a quality product. Through ownership of the agency's quality policy, the individual team members become the most effective way to implement quality into products efficiently and completely. A quality policy cannot rely on adding quality at the end of a process; quality must be built into the work of each individual on the team. It is far more cost-effective to have team members add quality into their day-to-day jobs than to have a quality analyst find a problem after a process has been completed.

Checklists

Quality checklists are often developed as part of the quality procedure definitions. The checklists and associated quality procedures are developed individually by each State agency according to its policy and the needs of the project. The Quality Plan is integral to, and a document contained in, the Project Plan.

Quality Plan Template

The Quality Plan Template can be found on the following page, as well as in Appendix B.

Quality Planning Template

State of Michigan
(Insert Agency Name Here)
Quality Plan

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:	______________	***Date:***	______________
Controlling Agency:	______________	***Modification Date:***	______________
Prepared by:	______________	***Authorized by:***	______________

B. Project Scope

Describe the project, either by inserting the Project Scope Statement or by providing a summary description of the overall project, its objectives, its customer, and its customer's business needs.

C. Deliverable Description

Describe project deliverables, including contract deliverables and milestone checklist.

D. Acceptance Criteria

Describe acceptance criteria for deliverables as they will be used in product acceptance testing. List relevant quality standards.

E. Quality Assurance Activities

Define Quality Assurance activities for the project including test and acceptance processes, documentation and operational support transition, milestone checklist, requirement verification processes, schedule and communication activities, and continuous improvement processes.

Quality Planning Template

F. Project Monitoring and Control

Define in-process control plans which address quality assurance activity areas, how control information will be collected, how information will be used to control processes and deliverables, what and when audits and reviews are required, and how variance to acceptable criteria will be reported and resolved.

G. Project Team Quality Responsibilities

Describe quality-related responsibilities of the project team including specific tasks such as acceptance test, audit, review and checklist responsibility assignments.

Communications Planning

Communications Planning

Communications planning involves defining the information needs of project stakeholders as well as identifying which people need what information, when it will be needed, and how they will get it. Communication is the cornerstone of how work gets done among different parties within a project. Communications planning is a process that overlays all other parts of project planning as well as the other phases because it is the way in which we transfer what needs to be done, how it will be done, when it needs to be done, by whom it will be done, etc.

The relationship of communications planning to the rest of the Planning Phase components is shown in Figure 3.38.

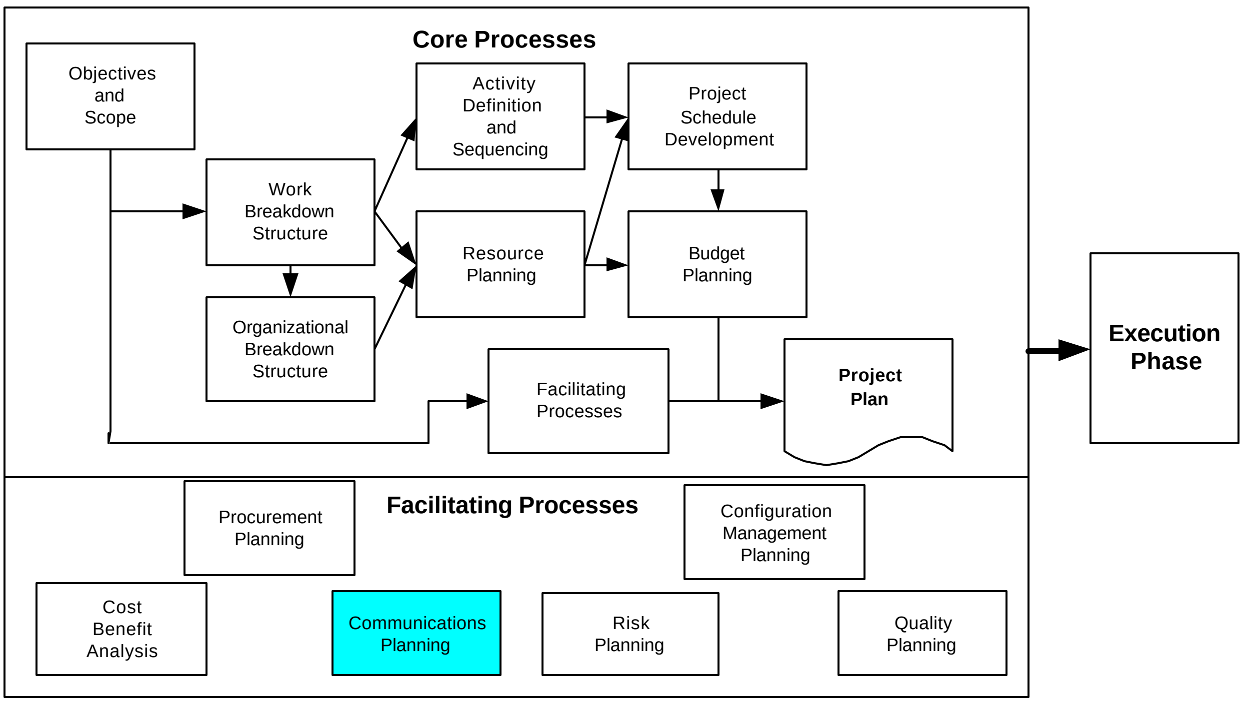

Figure 3.38
Communications Planning Identified in the Planning Processes

Communications Information Requirements

Beginning to develop a Communications Plan involves understanding who within the agency or project organization will be needing what information and their relationship to the project. The number of team members involved with the project and their locations is also a consideration when making decisions on how best to handle project interaction.

To begin developing a communications infrastructure, it is necessary to know and understand considerable data. The information required by people throughout the project is often dictated by the organizational structure of the agency. Information that is disseminated should contribute to project success or highlight possible areas of communication failure.

Other data are also needed to assist the project manager in the creation of the Communications Plan. These data will help the project manager develop the infrastructure for creation and dissemination of information. The following

Communications Planning

questions highlight information needs:

- How quickly will people need the project information?
- How often will they need information?
- What is the most convenient form of media for all team members and stakeholders (electronic, paper, etc.)?
- Are there already communications systems in place that can be taken advantage of?
- How long will people be involved with the project and need to receive information?

Communications Plan

After collecting information on the number and needs of the stakeholders involved with the project, it is the project manager's responsibility to draft a Communications Plan that outlines the following:

- ***How information will be collected and updated.*** This section of the plan discusses how the project manager will collect information from certain project areas and how often updated information will be expected to be reported. It should also discuss what action will be taken if important information needs to be updated between project information collection cycles.
- ***How information will be controlled and distributed.*** This section of the plan provides a description of how project information will flow throughout the agency and who will make decisions on where information flows. This section also discusses which stakeholders and team members will have access to which particular areas of information. The intent of the distribution part of this section is not to limit team members from being able to access data that they need, but to provide a structure to keep anyone looking to do damage to the project away from sensitive materials. Information security policies should be referenced here.
- ***How information will be stored.*** This section of the plan gives project members an idea where physical project files will be kept within the agency as well as where electronic media might be stored for project team access.

Communications Plan Template

The Communications Plan Template can be found on the following page, as well as in Appendix B.

Communications Planning Template

State of Michigan
(Insert Agency Name Here)
Communications Plan

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

B. Timeliness

Describe how quickly and how often the project information will need to be communicated to the stakeholders.

Stakeholders: (Monthly)

Sponsor: (Monthly)

Project Manager: (Weekly)

Project Team: (Biweekly)

Procurement: (Monthly)

Quality: (Biweekly)

Configuration Management: (Monthly)

C. Information Type

Describe how different types of information will be disseminated. (Voice, electronic mail, spreadsheet, formal presentation.)

D. Existing Systems

Discuss the communication systems already in place and how they will be leveraged on the project. Include any political environmental considerations.

Communications Planning Template

E. Length of Involvement

Describe how long individual stakeholders will continue to receive information on the project.

F. Environmental Considerations

Study the political environment, understand stakeholder requirements and other environmental considerations.

G. Method for Updating the Communication Plan

Describe how and when the Communications Plan will be updated throughout the project.

Performance Reporting

Performance Reporting

There are various types of performance reports that may be requested within a project. These reports provide information on how resources within the project are being utilized. The most common type of report is the Project Status Report.

These reports cover multiple areas, including scope, budget, schedule, risk, procurement, and quality. In order to produce status reports, the project team members must be aware of their project responsibilities and monitor them closely.

Project Status Reports

Project reports tend to differ from agency to agency and from project to project. Each project manager prefers to see these reports in a certain format. This is an area, however, that should be included within the Communications Plan. It is a good idea for the project manager to create status reporting templates for the project team and discuss what are the expectations for filling them out (including detail and frequency).

The status report template and instructions can be found on the following pages in this section; in Section 4, the Execution Phase; and in Appendix B.

Project Status Report Instructions

Project Status Reports are generally produced on a weekly or biweekly basis by key project team members. These team members should know what they are responsible for performing on the project. Status reporting is an integral part of the project management processes. It is the means by which the project team, the contractors, and executive management stay informed about the progress of the project and key activities required to complete the project. The purpose of the Project Status Report, like status meetings, is to develop a standard format for the formal exchange of information on the progress of the project. The Project Status Reports should be tailored to the individual project and should be in the same format throughout the project.

The Project Status Reports prepared by the project team should detail activities, accomplishments, milestones, identified issues, and problems. Some level of recovery plans should be prepared for activities that are not on schedule, and some level of corrective action plans should be prepared for anticipated problems.

The Project Status Report Template will be used to report key information such as the following:

- Current activity status
- Significant accomplishments for current period
- Planned activities for next period
- Financial status
- Technical status/issues
- Previous action items
- Last risk update, status

Along with the Status Report Template, the following may be attached:

- Updated Gantt charts

Performance Reporting

- Recovery plans for activities not on schedule defined by the project team as being late (e.g., slippage in the critical path activities)
- Corrective action plans for expected problems
- Resolution to assigned action items (including the issues and action process)

Project Status Report Template

The Project Status Report Template can be found on the following page, as well as in Appendix B.

Project Status Report Template

State of Michigan
(Insert Agency Name Here)
Project Status Report

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Authorized by:***	

Project is: ☐ **On Plan** ☐ **Ahead of Plan** ☐ **Behind Plan**

Reporting Period: **From** **To**

B. Current Activity Status

Attach any relevant Change Control Requests.

The description of activity should not span more than 2 to 3 lines. Activities should be linked to the project tasks list or Work Breakdown Structure.

C. Significant Accomplishments for Current Period

A summary of the significant accomplishments and project deliverables during the reporting period.

D. Planned Activities for Next Period

The description of activity should not span more than 2 to 3 lines. Activities should be linked to the project tasks list or Work Breakdown Structure.

E. Financial Status

Covers planned versus actual costs and budgets.

	Planned (to date)	Actual (to date)
Costs		
Schedule		
Staffing		

Project Status Report Template

Estimate to Complete (ETC) Review		
Estimate at Completion (EAC) Projection		

F. Technical Status/Issues

Identify technical issues impacting the project. Attach any relevant Issues Documents to this status report.

Discusses any relevant technical issues at this point in the project.

G. Previous Action Items

Covers any open action items from previous status reports.

H. Last Risk Update, Status

Covers any risk status reports since the last status report.

Configuration Management Planning

Configuration Management Planning

As stated throughout the Project Planning section, there are fundamental components that are started before the Execution Phase of the project in order for the project team to be able to do the necessary planning, organizing, monitoring, and controlling functions once the project has been baselined and begun.

The relationship of configuration management to the rest of the Planning Phase components is shown in Figure 3.39.

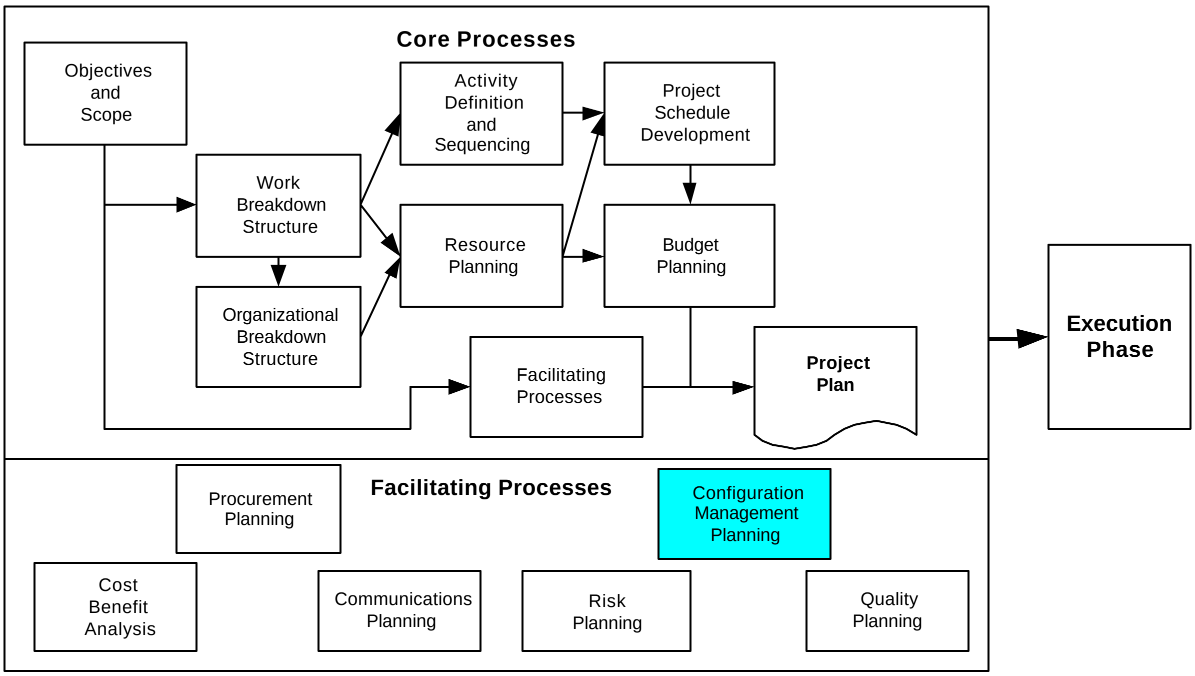

Figure 3.39
Configuration Management Identified in the Planning Processes

While the project manager, in theory, is responsible for all of the management aspects of a project, it is rare for one person to do all of these tasks alone. In fact, some of these tasks should not be performed by the project manager because of their time-consuming nature. These necessary support tasks should be divided into administrative and technical support functions and are shown in Figure 3.40.

The administrative functions are fairly obvious and can be further expanded in very large projects to include scheduling and budgeting. Within the technical support functions, configuration management ensures that changes to the product being developed are controlled; quality assurance monitors and controls the quality of the product being developed; and testing verifies compliance with the stated requirements of the product being developed.

For the most part, configuration management applies to information technology projects as discussed in the Information Technology Components for Project Planning in the last subsection of the Project Planning section. However, Configuration Management does have some practical application in general project management. While most of the tasks that involve the

Configuration Management Planning

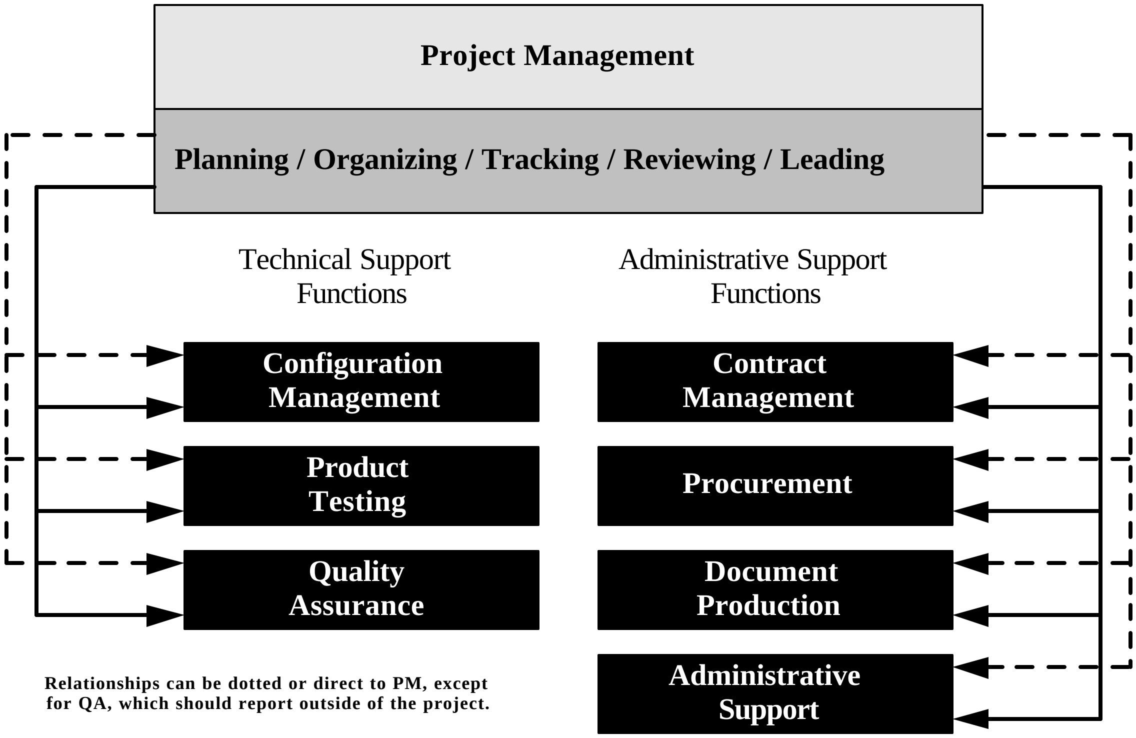

Figure 3.40
Project Management Support Functions

technical support functions actually occur during the Execution and Control Phases of project management, it is still important to discuss the planning of these functions ahead of time during the Planning Phase.

It is the project manager's responsibility to organize the project support groups and to document their planned activities. In the basic IT Project Plan, testing is considered part of the development effort to support a wide number of development methodologies currently in use by different State agencies. This does not preclude a State agency from developing a Testing Plan as part of the Project Plan.

Agencies can, and often should, add this as one of the many optional sub-plans.

Terminology

Within the general project management industry, neither the use nor the meaning of Configuration Management terms has been standardized. IT configuration control terminology has been omitted from this subsection of the methodology, but is discussed within the Information Technology subsection of the Planning Phase. For the purposes of this document, the following terms apply to Configuration Management:

Configuration management is the technical and administrative application of configuration control. It includes the maintenance of a configuration control unit, change and version control standards, and configuration of

Configuration Management Planning

control facilities. Configuration management is a formal discipline that provides project team members and customers with the methods and tools that are used to identify the product being developed, establish baselines, control changes to these baselines, record and track status, and audit the product.

Control item is a project element that is considered a unit for the purpose of Configuration Management. In discussion of general project management, a control item may include such things as the product design, the Project Plan, and other associated documents.

Change control is the process of controlling, documenting, and storing the changes to control items. Change control includes proposing the change, evaluating it, approving or rejecting it, scheduling it, and tracking it.

Configuration control is the process of evaluating, approving or disapproving, and managing changes to controlled items.

Configuration Management Function

Effective configuration management requires an effective and well-defined Configuration Management effort. The following are Configuration Management functions:

- Defining who will be responsible for and have authority over configuration management
- Setting standards, procedures, and guidelines for the full project team to follow
- Defining tools, resources, and facilities to be used for configuration management

The Configuration Management document could range from a few pages to hundreds of pages for very large software development activities with extensive procedures and control items. The size depends, of course, on the complexity of the project and the need for detailed control. The detailed Configuration Management information is represented as a template. The relationship of the Configuration Management summary in the Project Plan and the detailed Configuration Management Plan is depicted in Figure 3.41.

Configuration Management Planning

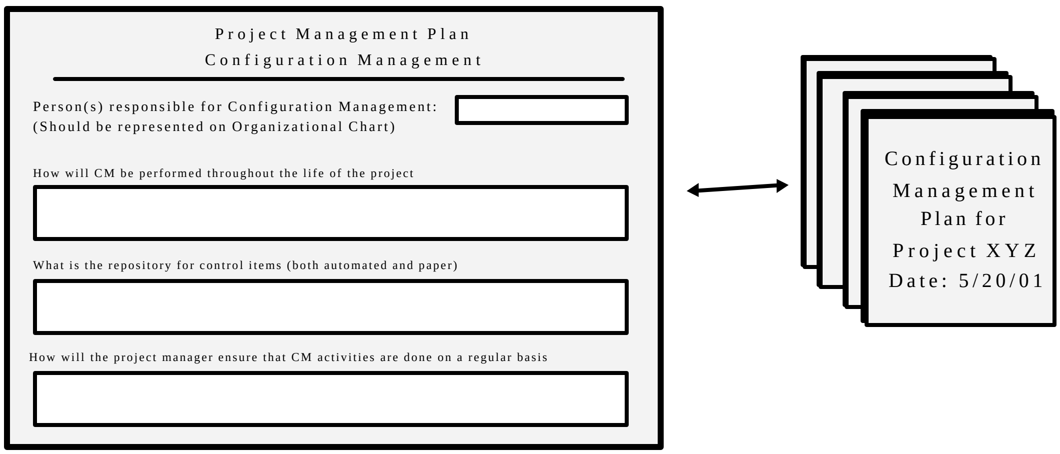

Figure 3.41
Project Management Configuration Management Summary

Configuration Management Plan

The Configuration Management Plan can be a part of the Project Plan. A sample Configuration Management Plan outline is shown below.

Sample Outline for a Configuration Management Plan

1. Configuration Management Functional Area and Resources

- 1.1 Organization structure
- 1.2 Personnel skill level and qualifications
- 1.3 Facilities needed
- 1.4 Equipment and tools used

2. Standards, Procedures, Policies, and Guidelines

- 2.1 Diagram of information flow
- 2.2 Parameter for the automated tools sets

3. Configuration Identification

- 3.1 Method for defining control item
- 3.2 Method for configuration control
- 3.3 List of control items

4. Identification Methods

- 4.1 Naming and marking of documents, components, versions, releases, etc.

Configuration Management Planning

5. Submission and Retrieval of Control Items

5.1 Check-in/check-out process

6. Version Control

6.1 Preparation of documentation versions
6.2 Release approval procedure

7. Storage Handling and Delivery of Project Media

7.1 Storage requirements (both automated and paper)

8. Relationship to Contractor Configuration Management
(include their plan and procedures if separate from the state's processes)

9. Other Information

Tasks During the Planning Phase

During the Planning Phase, the project manager defines the group or persons responsible for project Configuration Management and defines the procedure and required resources for performing Configuration Management. During the Planning Phase, the project team also identifies the control items. The goals are the following:

- To explicitly assign Configuration Management authority and responsibility for the project
- To ensure that Configuration Management is implemented throughout the project by setting standards, procedures, and guidelines that are produced and distributed to the full project team
- To ensure that project management has a repository for storing configuration items and associated Configuration Management records
- To ensure that quality assurance reviews the baselines and Configuration Management activities on a regular basis

Relationship of Quality and Configuration Management

Many of the issues related to Configuration Management are similar to the issues related to developing a project's quality system. In fact, in software development projects, many of the tasks for quality assurance and Configuration Management overlap. For this reason, a clear definition needs to be established, even at the Planning Phase, as to who will play what role. Because of this strong relationship, many projects have pointers between the various quality and Configuration Management plans to avoid redundancy.

Authority and Responsibility

Every project includes some level of development or integration activity that requires Configuration Management. Projects need to include at least a manual configuration control process for storing, retrieving, and changing project requirement documents and management documents. The responsibility for Configuration Management is assigned and clearly shown in the Configuration Management Plan subsection of the Project Plan.

Configuration Management Planning

The Configuration Management authority and responsibility can be handled in one of two ways:

1. The State agency maintains a standard, enterprise-wide approach to CM and has an identified group or functional areas responsible for these tasks on all projects undertaken.
2. The project develops a sub-team within the project management structure to perform the Configuration Management. This team may be assigned to the project on a full-time or part-time basis, depending on the size of the project.

In either case, both the authority (to be able to make decisions on configuration control activities) and the responsibility (to define what areas fall within Configuration Management) must be clearly defined. The Configuration Management authority is involved in all development activities and has the specific authority to approve or reject configuration items.

Configuration Elements

During the early stages of project planning, the project team, the person responsible for Configuration Management, and the project manager define the elements placed under configuration control. The list of control items is not standard. The best place to start is with the activity list and work breakdown structure.

Typically, all major milestones and deliverables are controlled. The actual project documents and products created are also controlled. For example, the Configuration Management team might want to control the Project Plan (schedules, budgets, contracts), support function plans, and correspondence and other documents necessary to recreate a project.

Configuration Management Procedures

Procedures and tools are necessary to ensure successful implementation of a Configuration Management process. In the Planning Phase, fully defined configuration procedures are not necessary. In the Control Phase, the location of these detailed procedures and the definition of the process for enforcement are defined.

The plan also contains information on how the detailed procedures will be developed and specifies that these procedures are in place by project start-up. Some questions regarding key processes to be addressed in the procedures are the following:

- How do managers and project team members request and retrieve configuration control items?
- What are the numbering, sequencing, and data processes to be used?
- Does the project contain sensitive or security-driven data? If so, will the Configuration Management meet the control requirements for this data?
- Where is the location of controlled items, and how does the project team get access to them?
- What items will be placed under automated control and what items will be manually controlled?
- Will there be a Change Control Board (CCB) to determine when changes

will be allowed, and how will this interface with the Configuration Management procedures?

- Under what circumstances does a formal CCB meet and what sort of authorization is required (verbal or written)?
- What is the relationship to the quality team if these functions are not performed by the same group?

The plan may also include diagrams and flowcharts to describe procedures for submitting change requests and for reporting problems.

Configuration Management Process Flow

Figure 3.42 portrays a suggested overall flow of control items within a CM framework. The framework depicts a decision point in the process on whether or not to conduct a Cost/Schedule Impact Analysis (CSIA).

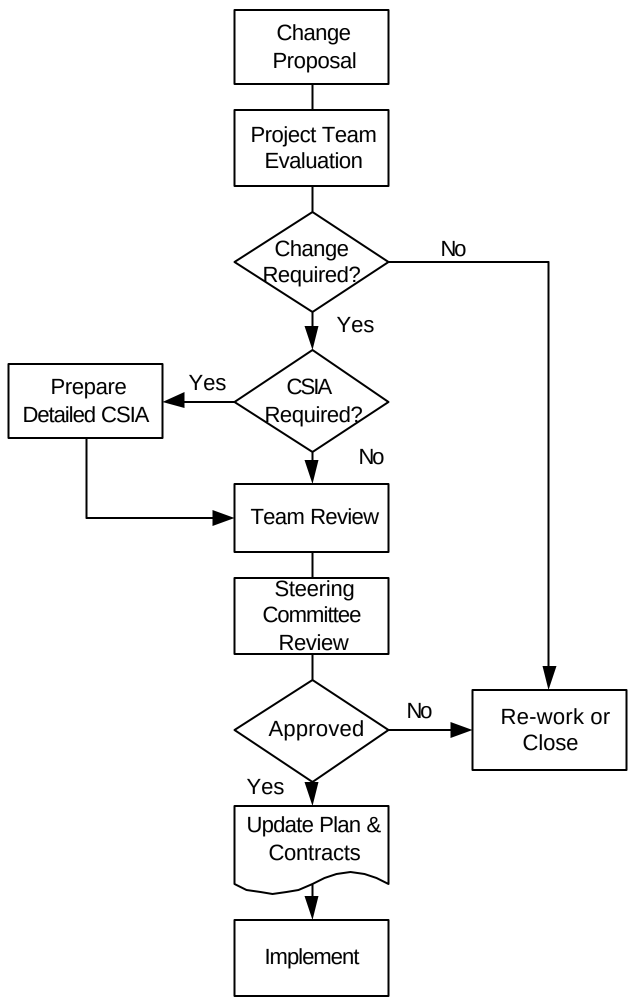

Figure 3.42
Control Item Flow within a Project

Configuration Management Planning

Configuration Management Repository and Storage

It is important to ensure that the project has a repository for storing controlled configuration items and associated Configuration Management records. This information should also be reasonably available to members of the project team and project stakeholders as necessary.

The Configuration Management environment includes the resources necessary for the implementation of the configuration plan. These resources include the following:

- Configuration control tools:
  - Automatic version control and change control tools
  - Monitoring, reviewing, and registration of support utilities
- Storage facilities—a safe repository for all approved configuration items, including the following:
  - On-site automated storage for the day-to-day development process
  - On-site paper storage for the day-to-day project for configuration control items that are not stored in automated form
  - Off-site storage for disaster recovery

Configuration management is one area in which many automated tools exist. Automated configuration control is best when used in a multi-user development environment, such as a local area network (LAN), to facilitate the sharing of project information and data and to allow for consistent application of the Configuration Management procedures. Controlled elements can be stored in a central database. Developer access is managed from a central configuration control system.

Without such a system, added manual controls and additional tasks for the project team may need to be imposed. Multi-location development is another environment that can be more easily handled with automated tools. The more complex the project, the easier it is to control with an automated Configuration Management system.

Configuration Management Goes Beyond the Project

Configuration management is a process that continues beyond the active project phases and into the maintenance and operation phases. A project that has clearly implemented a successful Configuration Management process adds to the value of the system once it is turned over for operation and reaches maintenance.

Configuration Management Plan Template

The Configuration Management Plan Template can be found on the following page, as well as in Appendix B.

Configuration Management Planning Template

State of Michigan
(Insert Agency Name Here)
Configuration Management Plan

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:	______________	***Date:***	______________
Controlling Agency:	______________	***Modification Date:***	______________
Prepared by:	______________	***Authorized by:***	______________

B. Configuration Management Functional Area and Resources

Describe the Configuration Management organization structure, personnel skill level and qualifications, facilities needed, and equipment and tools used.

C. Standards, Procedures, Policies, and Guidelines

Display the diagram of information flow and the parameter of any automated tool sets.

D. Configuration Identification

Describe the method for defining each control item, the method for configuration control, and the list of control items.

E. Identification Methods

Describe the naming and marking of documents, components, revisions, releases, etc.

F. Submission and Retrieval of Control Items

Describe the process for submission and retrieval of controlled items within the project.

Configuration Management Planning Template

G. Version Control

Describe the preparation of documentation versions and the release approval procedure.

H. Storage Handling and Delivery of Project Media

Describe storage requirements (both automated and paper).

I. Relationship to Contractor Configuration Management

Describe the relationship of the Configuration Management team to other Configuration Management teams related to the project.

J. Other Information

Relay any other information about Configuration Management.

Project Budgeting

Budget Planning Introduction

Paralleling the project schedule development is budget planning. Budgeting, performed at the initial stages of project planning, is the determination of costs associated with the defined activities. The steps associated with budgeting are highly dependent on both the estimated lengths of tasks and the resources assigned to the project.

The relationship of budget planning to the rest of the Planning Phase components is shown in Figure 3.43.

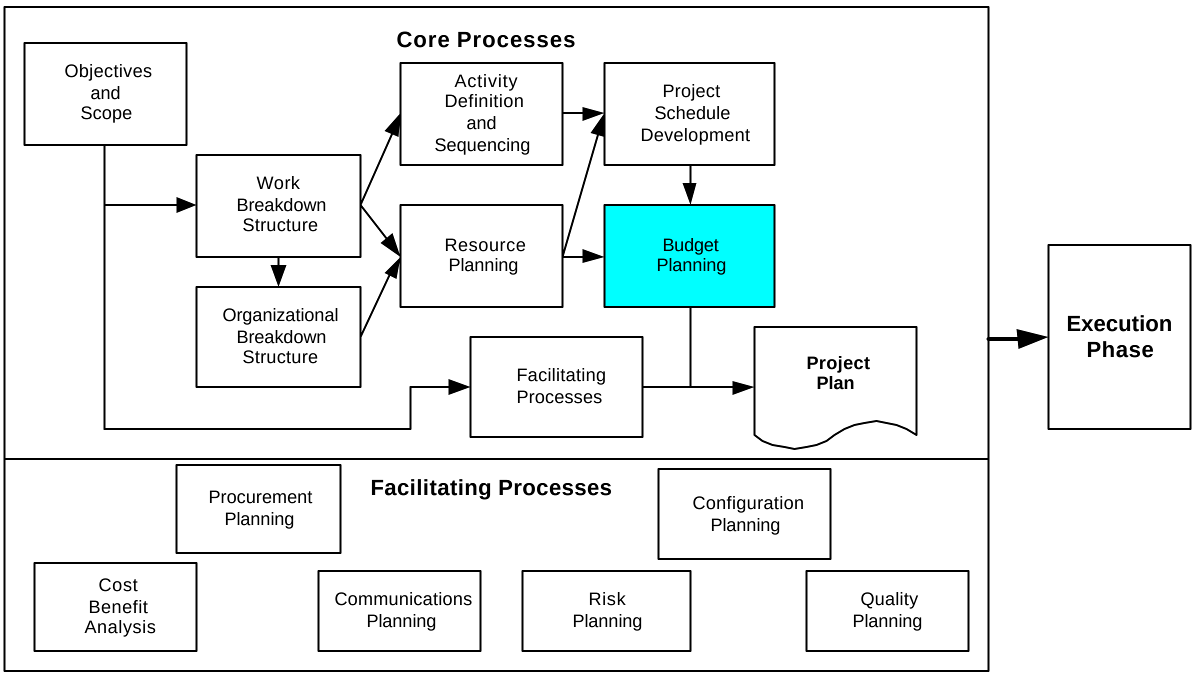

Figure 3.43
Budget Planning Identified in the Planning Processes

Overview of Project Budgeting

Initial budgetary estimates are often based on availability of funds or may be dictated by legislation. These parameters may or may not coincide with the actual funds needed to perform the project. For this reason, budget estimates are refined in the Planning Phase until they are baselined at the beginning of the Project Execution Phase.

Budgeting serves as a control mechanism where actual costs can be compared with and measured against the budget. The budget is often a fairly set parameter in the execution of the project. When a schedule begins to slip, cost is proportionally affected. When project costs begin to escalate, the project manager should revisit the Project Plan to determine whether scope, budget, or schedule needs adjusting.

Identify Cost Factors

To develop the budget, the applicable cost factors associated with project tasks are identified. The development of costs for each task should be simple and direct and consist of labor, material, and other direct costs. Cost

Project Budgeting

of performing a task is directly related to the personnel assigned to the task, the duration of the task, and the cost of any non-labor items required by the task.

Budget estimates are obtained from the people responsible for managing the work efforts. They provide the expertise required to make the estimate and provide buy-in and accountability during the actual performance of the task.

These team members identify people or labor categories required to perform the work and multiply the cost of the labor by the number of hours required to complete the task, as discussed in Scheduling. Determining how long the task performance takes is the single most difficult part of deriving a cost estimate. The labor costs should factor in vacation time, sick leave, breaks, meetings, and other day-to-day activities. Not including these factors jeopardizes both scheduling and cost estimates.

Non-labor charges include such items as material costs, reproduction, travel, cost of capital (if leasing equipment), computer center charges, and equipment costs.

Create Cost Model

Labor and non-labor cost information is entered into a cost-estimation system or spreadsheet, depending upon the complexity of the project. Spreadsheets or the Niku Portfolio Manager Suite work well for projects of small to medium scope. Figure 3.44 is a sample of a budget using a spreadsheet.

		Analysis in Hours						Analysis in Dollars				
WBS	Activity Description	Res #	Budget hours	Actual hours	Est to Complete	Est @ Complete	Variance (+=More)	Budget hours	Actual hours	Est to Complete	Est @ Complete	Variance (+=More)
2.0	DESIGN											
2.1	Prepare Preliminary Design	3	900	1,150	0	1,150	250	90,000	115,000	0	115,000	25,000
2.1.1	Develop Enterprise Architecture		400	500	0	500	100	40,000	50,000	0	50,000	10,000
2.1.2	Prepare Data Flow Diagrams		300	250	0	250	(50)	30,000	25,000	0	25,000	(5,000)
2.1.3	Prepare Logical Data Module		200	400	0	400	200	20,000	40,000	0	40,000	20,000
2.2	Prepare Detailed Design	5	1,000	640	408	1,048	48	100,000	64,000	40,8000	104,800	4,800
2.2.1	Prepare Physical Data Model		600	600	8	608	8	60,000	60,000	800	60,800	800
2.2.2	Prepare Data Dictionary		400	40	400	440	40	40,000	4,000	40,000	44,000	4,000
2.3	Document Design	2	430	0	430	430	0	43,000	0	43,000	43,000	0
2.3.1	Develop Design Specification		430		430	430	0	43,000	0	43,000	43,000	0
2.4	Design Review	10	160									
	Total for the Project		4,820	3,620	1676	5,256	646	466,000	358,000	167,600	525,600	59,600

Figure 3.44
Sample Estimated at Completion Summary

Project Budgeting

For large systems, the Niku Portfolio Manager Suite, or specialized cost management software, is typically preferred for cost estimation. A Project Estimate Summary worksheet is another appropriate model for costing and can be useful if completed prior to entering information into a tool. Tasks included in this sample should be tailored to specific project cases.

Costs should be assigned to the lowest level work breakdown structure work package task. These costs are then combined to determine a subtask cost. In turn, subtask costs are combined to determine the overall task cost, which can be summed to find the total project cost.

Perform Risk Analysis

Identifying and quantifying project risk is inherently involved with budgeting any project. Good budgeting practices make allowances for dealing with risk in one or more of the following ways:

- Where significant budgetary risks are identified, add another work breakdown structure task for risk management/risk reduction, where financial reserves can be set aside to deal with potential budget problems.
- Budget for those tasks where risks are inherent. There is no rule of thumb for this multiplier; it depends on the degree of risk and the overall importance of the task to the project.
- Add a percentage multiplier to the budget where there are risks, especially if new technology is being used or if the person providing the estimate is extremely optimistic. Also, technical staff frequently underestimate the effort required to do any particular task. This could result in serious budget problems during implementation.

Document Assumptions

As with developing a project schedule, documenting assumptions made while developing the project budget is critical to the success of the project. Without clear documentation of these assumptions, tracking to the budget is very difficult and risky.

If, for example, a budget assumed that the material would be acquired at one price rate and only substantially higher cost material was available to perform the task, there would be a budget problem. If the assumption is not documented, the project manager may inadvertently increase project cost unknowingly and may unwittingly jeopardize chances for the project's success.

Review the Cost Estimates

Development of project budgets typically requires more than one person. Rarely does a single individual have the knowledge and understanding of all the factors affecting every aspect of a project. A good process is to have the same people who reviewed the activity list and schedule review the budget.

Upon completion of a draft budget, interview the team and determine if the work descriptions, schedule, and associated budgets are complete and accurate. Determine if there is a common understanding of what it costs to do the tasks. Get independent estimates. Where there are significant differences, determine the reasons and either redefine the work packages, schedule, and budgets or review and reiterate the estimates.

Project Budgeting

A large component of the budget is labor costs. Carefully determine that the reviewer is providing an estimate of the calendar time required to perform the task based on the actual labor hours needed. The total labor days per phase can also be checked against the rule of thumb that suggests the following distribution of development of an information technology project effort and cost:

- 40% for planning and design
  (For small to mid-size projects - approximately10% of the project budget should be earmarked for project management, for large projects - this amount is approximately 5 to 10% of the project budget)
- 20% for development
- 40% for component and system testing

It is extremely important to get buy-in on the budget from the people who will actually perform the work. Participation results in having a stake in the project's success and fosters accountability. Imposing budgets on staff without a buy-in may result in slippage.

Budget Format

The project budget is included in the Project Plan as the Project Budget Estimate. The initial project budget is shown in the budgeted columns and the actual expenditures are compared on a regular basis to the plan.

IT Project Budget Estimate Template

The Information Technology Project Budget Estimate Template can be found on the following page, as well as in Appendix B.

IT Project Budget Estimate Template

State of Michigan
(Insert Agency Name Here)
IT Project Budget Estimate Template

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name: ____________________ ***Date:*** ____________________

Controlling Agency: ____________________ ***Modification Date:*** ____________________

Prepared by: ____________________ ***Authorized by:*** ____________________

Project Task		Labor Hour	Labor Cost	Material Cost	Travel Cost	Other Cost	Total per Task
1.	Project Design						
1.1	Develop Functional Specifications						
1.2	Develop System Architecture						
1.3	Develop Preliminary Design Specification						
1.4	Develop Detailed Design Specifications						
1.5	Develop Acceptance Test Plan						
2.	Project Development						
2.1	Develop Components						
2.2	Procure Hardware						
2.3	Development Acceptance Test Package						
2.4	Perform Unit/Integration Test						
3.	Install System						
4.	Train Customers						
5.	Perform Acceptance Test						
6.	Perform Post Project Review						
7.	Provide Warranty Support						

IT Project Budget Estimate Template

8.	Archive Materials						
9.	Project Management						
9.1	Customer Progress Meetings/Reports						
9.2	Internal Status Meetings/Reports						
9.3	Third-Party Vendor Interface						
9.4	Interface to Other Internal Agencies						
9.5	Configuration Management						
9.6	Quality Assurance						
Other:							
Subtotals:							
Risk (Contingency)							
TOTAL (scheduled)							
Comments: *(List assumptions for costs as appropriate.)*							

Planning Throughout the Project

Planning Throughout the Project

Planning does not necessarily start or stop within the Planning Phase of the project. The following subsections discuss planning throughout the project phases.

Planning in the Initiation Phase

In the project's Initiation Phase, a need that would result in a product is identified. While only very general information may be known about the project at this time, it is important to capture this information for the Planning Phase. In this stage, the focus of planning is on the project definition and on getting the project underway.

A strategy for deriving a solution to the stated goals is important at this point. The problem being addressed by the project is clearly stated, the project goals and objectives are identified, and success criteria for the project are documented. Also, the assumptions, constraints, and risks that apply to the project are defined. Without a description of this initial concept information, the completed Project Plan is difficult to understand. Results of the technology assessment also are documented as a precursor to the technical approach that is later defined.

Planning in the Planning Phase

The Project Plan is completed in the Planning Phase of a project. For large projects, this stage may be run as a mini-project with a team of people dedicated to performing the effort. For very small projects, the plan may be developed by a group of people as a part-time job. Because various skill sets are required to complete a successful Project Plan, it is a difficult task for one person to develop the entire plan.

During this project phase, details of the plan are determined and an approach is defined. The full Project Plan is then developed. The plan may include the following elements:

- A brief project summary
- A work breakdown structure
- A project organization chart
- A schedule
- An approach
- A list of identified risks
- An estimated budget and cost
- A list of deliverables
- A description of planned quality activities
- A description of the configuration management process to be used
- A summary of project requirements

Even during the Project Planning Phase, the development of the Project Plan is an iterative process. Each element of the plan is regularly revisited for changes and refinements, based on further analysis and decisions made in developing other plan elements. This refinement also develops buy-in from the project team and stakeholders.

It is critical to get buy-in to the Project Plan from the involved parties prior to actually starting the project. Approval of the plan commits the resources

Planning Throughout the Project

needed to perform the work.

Planning in the Project Execution and Control Phases

Planning in the Project Execution and Control Phases consist of replanning when it is determined that the project is not on track with the current plan. This is an iterative process in which the plan (from the Project Planning Phase) is executed and then reviewed and analyzed throughout the Control Phase. If it is necessary to make changes or adjustments, then the plan or plans are revisited.

This might occur for a variety of reasons. It is very important to realize that the Project Plan will change and that replanning is a natural part of the planning process. Replanning does not necessarily mean that a project is in trouble.

Frequent and extensive replanning may, however, indicate that there are some serious issues with the Project Plan. It is better to replan than to simply throw away the original plan and operate without a plan.

Planning in the Closeout Phase

A closeout process is performed once the project objectives have been met. Closing a project should be fairly routine, and planning for turnover to operations is necessary here.

Project Planning Transition Checklist

Project Planning Transition Checklist

In order to transition from the Planning Phase to the Execution Phase of the project, it is important to make sure that all the necessary plans and documents pertinent to the project in question have been completed. This subsection discusses the process of ensuring that the activities have been finished, reviewed, and signed off so that the project may move into the Execution Phase.

Usefulness of Project Checklists

A good way to ensure that all start-up tasks are completed prior to actually starting the project is to develop a transition checklist. The checklist can be developed and then used by others to ensure that the tasks necessary to baseline the project are completed.

A Project Planning Transition Checklist becomes a way for the project manager to organize and communicate tasks that should be completed prior to starting the project. For large projects, some of the start-up tasks could take as long as some of the initial planning steps.

Beyond serving as a communication document, the Transition Checklist can also trigger completion of tasks that the project team might overlook. The Planning Phase is usually characterized as one of impatience. In most cases, it takes a very long time to get the project through the Initiation Phase and actually approved and initiated.

Project Planning Transition Checklist Defined

The Project Planning Transition Checklist is a combination of an action list and a tool to verify that necessary steps have been completed. The Transition Checklist should be organized according to the major areas of concern that will determine the project's success. The Transition Checklist consists of the following components:

- Planning
- Organization
- Tracking and monitoring processes
- Defining what will be tracked and monitored and the format for this information
- Reviewing the schedules and formats
- Reviewing the configuration management system and ensuring the assignment of this responsibility
- Reviewing the change control process and ensuring that it is institutionalized
- Determining how issues will be raised in the project and who will track their resolution
- Defining the risk management process
- Defining the change management process

The development and use of a Transition Checklist also provides the project team with the tools to ensure that all information has been reviewed and approved. This checklist can also help prioritize the sequence of items to be completed:

- Defining the project environment

Project Planning Transition Checklist

- Completing the project baseline
- Identifying project standards and tools
- Identifying and refining the roles and responsibilities of the project team members
- Setting expectations for the project team
- Defining all the project control processes
- Obtaining and allocating resources
- Initiating project kick-off meeting

Project Planning Transition Checklist Creation

The project manager owns the Project Planning Transition Checklist, although in most projects, the full team provides input. In large projects, the development and completion of the checklist might be assigned as an administrative support function.

Format of a Project Planning Transition Checklist

The format of the Project Planning Transition Checklist can be whatever the project team defines, but it usually resembles more of an outline than a dissertation. It could be single-line items with space provided to complete the checklist with the current status of an item. Sample answers might be the following:

- Y = Item has been addressed and is completed
- N = Item has not been addressed and needs to be to complete the process
- N/A = Item has not been addressed and is not related to this project
- P = Item has been addressed and some issue resolution is needed to complete the item or annotate it as “N/A”

If the item status information is modified, then the person responsible for the Transition Checklist should ensure that the information is given to the full project team for use.

Each item on the Transition Checklist should also have an area for comments and should note plans to resolve “N” or “P” entries.

The project team can choose to put this checklist under configuration management so that it may be shared.

The format can also be modified to the requirements of a particular project.

Project Planning Transition Checklist Template

The Project Planning Transition Checklist Template can be found on the following page, as well as in Appendix B.

Project Planning Transition Checklist Template

State of Michigan
(Insert Agency Name Here)
Project Planning Transition Checklist

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name: ______________ ***Date:*** ______________

Controlling Agency: ______________ ***Modification Date:*** ______________

Prepared by: ______________ ***Authorized by:*** ______________

WBS #	Item	Status	Comments/ Plan to Resolve
1	**Planning**		
1.1	Is the project statement -- scope, definition and objectives -- the same as agreed to in the project initiation process and/or in the vendor contract?		
1.2	Has the Project Scope Statement been reviewed as part of the baseline process?		
1.3	Is there a baseline plan against which to measure progress?		
1.4	Does the baseline plan address the following areas:		
1.4.1	Project Scope, Deliverables, and Milestones		
1.4.2	Work Breakdown Structure		
1.4.3	Task Plans, Estimates, Resource Assignments		
1.4.4	Task Dependencies		
1.4.5	Project Schedule		
1.4.6	Milestone Schedule		
1.4.7	Project progress tracking		
1.4.8	Issue Resolution and Change Management		
1.4.9	Quality Plan		
1.4.10	Risk Management Plan		
1.4.11	Project Organization		
	Other Plans as needed:		
1.4.12	Facilities Plan		
1.4.13	Documentation Plan		
1.4.14	Materials Plan		
1.4.15	Training Plan		
1.4.16	Back-up and Recovery Plan		
1.4.17	Contingency Plan		
1.4.18	Cut Over Plan		
1.4.19	Warranty Plan		

Project Planning Transition Checklist Template

WBS #	Item	Status	Comments/ Plan to Resolve
1.4.20	Transition Plan		
1.4.21	Others		
1.5	Is the plan for project resources adequate?		
1.6	Are the original project schedule and budget realistic?		
1.7	Is the plan for the organization of the project resources adequate?		
1.8	Are there adequate project control systems?		
1.9	Is there an information system for the project?		
1.10	Were key project stakeholders brought into the Project Plan?		
1.11	Were potential customers involved early in the planning process?		
1.12	Was planning completed before the project was initiated?		
1.13	Is the plan under configuration management?		
1.14	If there are vendors, have they signed off on the Project Plan?		
1.15	If there is an independent oversight contractor, have they signed off on the Project Plan?		
2	**Organization**		
2.1	Is the project organization documented and on file?		
2.2	Is the Project Manager qualified and experienced in Project Management?		
2.3	Have roles and responsibilities of the team been documented and clearly communicated to the team, customer, and stakeholders?		
2.4	Is the organization structure appropriate for the project's size and complexity?		
2.5	Is there an identified role of a technical leader (i.e., Project Lead, Team Lead, Solution Architect)?		
2.6	Is the quality function identified and assigned?		
2.7	Is the Project Sponsor function identified and defined?		
2.8	Is there a Change Management Board?		
2.9	Have the Configuration Management functions been assigned?		
2.10	Are there backup strategies for key members of the project?		
2.11	Other Organization items:		
3	**Tracking & Monitoring**		
3.1	Are the various types of reports, their contents, frequency, and audience defined and communicated to the project team?		
3.2	Are the input requirements from the team members clearly documented and communicated?		
3.3	Have the reports to be produced, distributed, and filed been defined?		
3.4	Has the format for tracking and monitoring schedules and costs been defined?		

Project Planning Transition Checklist Template

WBS #	Item	Status	Comments/ Plan to Resolve
4	**Reviewing**		
4.1	Have the various meetings, the purpose, context, frequency, and participants been defined and communicated?		
4.2	What are the defined meeting materials?		
4.3	Are the meetings set up to have assigned note takers that will add actions/issues to the issue list?		
5	**Issue Management**		
5.1	Is an Issue Management Process documented and filed?		
5.2	Is this process communicated to the customer and team members?		
5.3	Will an issue form be in use?		
5.4	Will all project issues be unconditionally tracked through the issue resolution process?		
5.5	Will all tasks resulting from issues be entered into the Project Plan and tracked through the plan?		
5.6	Are there processes for unresolved issues to be escalated and resolved within a reasonable timeframe?		
6	**Change Control**		
6.1	Will there be a Change Control Process in place?		
6.2	Is the Change Control Process documented and on file?		
6.3	Will this process be communicated to the customer and project team?		
6.4	Will there be a change request form in use?		
6.5	Will all project deliverable and software configuration management be changed only through the change control process?		
6.6	Will all change requests be unconditionally tracked through this process?		
6.7	Will all change requests and current status be logged?		
6.8	Will all tasks resulting from approved changes be entered into the Project Plan and tracked through the plan?		
6.9	Will new change requests be acknowledged in a timely manner?		
7	**Risk Management**		
7.1	Will the project risks being managed be according to the project's risk management process?		
7.2	Will the Risk Plan be updated on a regular and frequent basis?		
7.3	Will the Risk Status be reported to management on a regular and frequent basis?		
7.4	Will the risk documents be filed?		
7.5	Will there be documented contingency plans for the top 5-10 risks?		

Project Planning Transition Checklist Template

WBS #	Item	Status	Comments/ Plan to Resolve
7.6	Will the Preventive Plans for the top 5 risks be identified, included in the Project Plan, and implemented?		
8	**Quality Assurance**		
8.1	Is there a Quality Assurance Plan documented and filed?		
8.2	Are the quality assurance functions and related roles and responsibilities clearly defined?		
8.3	Are there completion/verification criteria defined for each task producing an output?		
8.4	Is there a process (test plans, inspections, reviews) defined for verifying outputs for each task?		
8.5	Will tasks be marked “complete” only after QA has been successfully completed?		
8.6	Will there be a formal process for submitting, logging, tracking, and reporting items undergoing QA throughout the submit-test-rework-resubmit-retest cycle?		
8.7	Will statistics related to QA be collected, trends analyzed, and problems raised as issues?		
8.8	Will the QA related information be reported regularly as part of the Status Reporting mechanisms?		
8.9	Has a method and process for requirement tracking been developed?		

B. Signatures

The signatures of the people below relay an understanding that the key elements within the Planning Phase section are complete and the project team is ready to transition to the Execution Phase.

Name/Title	Signature	Date

Information Technology Components for Project Planning

Information Technology Project Planning

Project Planning is the most important phase of any type of project, including information technology projects. It is during this phase that the document baseline and processes that will be used to guide all the work to be done in the project will be created. Being able to manage communication, budgets, risk, and the other assorted project management competencies is of infinite importance because these processes create the infrastructure that allows technical project staff to commit themselves to producing quality documents and deliverables.

The table below relates the System Development Life Cycle (SDLC) deliverables to those of the Project Management Planning Phase. While the intent of this methodology is to focus on the development of the project management competencies, it is nonetheless important to note that the interrelation of these two life cycles is important to the success of the project. The project planning documents will feed off the information provided in the SCLC deliverables.

	System Development Life Cycle Methodology Deliverables	Project Management Planning Phase Deliverables
Planning Phase	• Work Statement • Requirements Documents • Solutions Documents • Specifications Documents • Design Schedules • Detail Design Documents	• Project Scope Statement • Critical Success Factors • Work Breakdown Structure • Cost-Benefit Analysis • Resource Plan • Project Schedule • Risk Plan • Procurement Plan • Quality Plan • Communications Plan • Configuration Management Plan • Project Budget Estimate • Project Planning Transition Checklist

A review of the Project Management Methodology, reveals that the deliverables of the Project Planning Phase build upon each other. For instance, the Project Scope Statement defines the work breakdown structure, which in turn provides input to the Resource Plan and budget estimate. Ultimately, the sum of all of these elements creates the Project Plan from which the whole project flows. None of these documents can be created in a vacuum and none can be created without the input from the technical staff creating the SDLC deliverables.

The role of project management, however, is once again about responsibilities. The project manager is responsible for initiating, planning, executing, controlling, and closing as opposed to being involved with the technical development of the product itself. The remainder of this section explains what project managers need to do to ensure that the project management objectives are reached during the Planning Phase of an information technology project.

Information Technology Components for Project Planning

Information Technology Project Scope Statement

The Information Technology Project Scope Statement is intended to be a high-level document that outlines the following:

- ***Project Results/Completion Criteria***. What will be created in terms of deliverables (and their characteristics) and what constitutes a successful phase completion.
- ***The Approach to be Used***. What type of process or technology will be used, whether the project will be done internally or externally, etc.
- ***Content of the Project.*** What will and will not be included in the work to be done.

In this respect, IT projects are no different than any other project. There is no need to have the level of detail in a Project Scope Statement that a formal Requirements Document includes. While the Information Technology Project Scope Statement makes reference to technology issues (such as the technology to be used), it is not intended to be a technical document. The audience of the Information Technology Project Scope Statement is interested in what will be achieved, rather than what the technical requirements will be to carry out the project.

The same holds true for project specifications documents. At this point in the specifications documents, the project staff is detailing the granular bits of information and outlining a level of specificity not necessarily needed at the project management level. Although it is advisable that the project manager be aware of the technical requirements and specifications of the project, this does not necessarily mean that it is the project manager's responsibility to create and manage their development personally.

A management-level understanding of the technology requirements and specifications is the expectation for a project manager. Remember that the project manager's responsibility is to provide management and guidance to the process—not to create the technical deliverable.

Further definition of the Project Scope Statement can be found in the Project Objectives and Scope subsection within this section. In addition, a Project Scope Statement Template is available in Appendix B.

Information Technology Work Breakdown Structure

The work breakdown structure is one of the most important pieces of the IT project process. IT projects are by their nature complex and typically require many different skill sets. The WBS takes the activities and tasks that need to be accomplished and breaks them down to their lowest element, which is known as a "work package". These work packages will help define the skills and resources needed to deliver a successful IT project. In addition, IT projects typically have a life of their own and are different from the normal WBS because they will call on specialized skills required in the SDLC.

A good idea to keep in mind during the development of the WBS is to identify the major phases of the SDLC as they apply to the project and identify what must be done to achieve completion of those phases. This is done by meeting with the responsible organizations for the SDLC phases and activities.

A detailed description of the WBS (as well as some hints to assist the project

Information Technology Components for Project Planning

manager in creating it) are available in the Work Breakdown Structure subsection of this section. Additionally, Figure 3.45 provides an example of a simple high-level Information Technology Work Breakdown Structure for review.

Information Technology Cost Benefit Analysis

Cost-Benefit Analysis (CBA) is one of the areas where IT projects differ slightly from other projects, but the intention and result remain constant. The technical side of the analysis considers the trade-off of applying one technical approach versus another. There are usually several technology options available to all projects. The rate at which technology is changing and improving has a dramatic impact on the cost and reasonability of using selected technologies. Therefore, the project manager must be aware of the cost implications of comparing one technology to another when performing a CBA.

The fact that there are competing technologies adds another dimension to the CBA. The decision is no longer limited to the question of whether an agency can or should take on a project. The additional information that must be considered is the decision to implement one technology over another. This type of information is usually compared in a technical trade-off analysis, but, in fact, each technical trade-off made will most likely have a financial impact on the cost of the project itself and consequently will affect the CBA. In short, the project manager may find that doing a project is not beneficial or possible because the cost of the technology needed to develop or create the deliverable reduces the overall benefit to the agency itself.

For example, a cost driver such as the expense to purchase an enterprise license for a software package may be too steep to justify the benefit of a project, or the purchase may produce the additional expense associated with bringing agency staff up to a level to support the project deliverable. A detailed description of the CBA is available in the Cost-Benefit Analysis subsection in this section and in Appendix B.

Information Technology Resource Plan

Once the tasks and activities have been defined, a Resource Plan will need to be created. This plan will include the technically skilled labor resources of the team and will define the actual management structure of the project. Furthermore, a defined set of non-labor resources can be identified as a result of review of the work breakdown structure. Resources on an IT project may include but not necessarily be limited to people, computers, hardware, software, tools, and facilities.

Skills and resources within an IT project are very important, and the WBS created by the project manager (not the technical staff) goes a long way toward pinpointing the necessary skills needed on high technology projects. With the vast array of technology applications and varying levels of knowledge in such areas, knowing what skill sets and resources will be needed ahead of time will be critical information for project success.

For instance, if a project manager knows that on a particular task a senior programmer will be needed for five days to code a module, it is critical to point this out to the functional manager responsible for the needed senior programmer and make sure that the programmer will be available during the

Information Technology Components for Project Planning

specified time within the project. It is unlikely that in a situation such as this the skill sets of senior programmer could be replaced by the application of two junior programmers at the same time. Project managers have the responsibility to request specific skill sets and schedule their availability. It is the responsibility of the technical personnel to do the technical work when the time comes. In this instance, the project manager's foresight, determination of needs, and eventual management actions will have a huge impact on the success and completion of the project.

Skill sets and their availability also have immediate impact on the duration estimates of activities and tasks. Being able to determine the difference in duration for an individual with a certain technical skill level versus one with another skill level can be a mind-bending experience. Knowing the capabilities of the project staff and determining the duration of the project activities given to them is critical.

In addition, the project manager must be able to discern from the discussions with the staff what the sequencing of the tasks will be. Realizing what tasks can be done in parallel and what tasks must be done in sequence will be crucial as the project manager attempts to create the project schedule. Only by careful analysis, planning, and asking the right questions will the project manager be able to determine the demands of the project.

Information Technology Schedule Development

Technology programs are especially time sensitive. As mentioned before, special skill sets needed within the project may only be available at certain times. It is also important to note that outputs from a particular segment of an IT project are often the inputs to other sections or deliverables of the project. IT projects may have many different dependencies and relationships that may not be obvious to the project manager. Therefore, it is important that the functional manager involve the technical team when attempting to determine the project task durations.

Keep in mind, while planning a project and developing a schedule, that certain concessions and considerations must be incorporated for the technical problems that may occur. Technical problems and requirement changes are common inputs to IT project risk. Different elements of risk, such as the use of new or unproven technology, hardware or software delivery schedules, and the changing cost of technology, can all have a dramatic impact on an IT project as well. Thorough risk analysis, which is discussed later, on these and other factors cannot be stressed enough.

Using the Niku Portfolio Manager Suite (or creating a resources matrix) can also be very helpful in managing and monitoring resource utilization and schedule progress. Knowledgeable use of Gantt charts and similar graphical aids can improve visibility and readability for all levels of project stakeholders.

Information Technology Risk Planning

As noted, risk is inherent in all parts of the Information Technology Project Planning Phase. Scope risk brings up the possibility of having to do additional work not previously identified to complete a project because the project was still unclear at the beginning of the Project Planning Phase. Resource risk deals with being able to find and retain at reasonable prices the

Information Technology Components for Project Planning

resources needed to accomplish a project during the time they are needed. Schedule risk revolves around the uncertainty in the length of time it will take to perform an activity that has never been attempted within the agency. Budget risk manifests itself in the uncertainty of labor and non-labor asset costs.

All these are areas that have potential to slow down, stop, or kill a project if the impact is severe enough. That having been said, project managers, along with their staff, must plan to identify as many of the known risks as they can before project execution takes place. Next, they will have to determine the likelihood of the event taking place and plan preventative measures. There are different types of contingencies and contingency reserves for different types of risk.

Preventative measures for schedules can take the form of slack built into the project schedule. Similarly, an additional budget category titled "Management Reserve" can be created as a budgetary contingency. Regardless of how the risk is expressed, it cannot be ignored. Project managers must use their experience, knowledge, common sense, and project staff to plan effectively. These things, with the association of usable and scalable risk tools, will go a long way toward planning against project risk.

Project risk is described in greater detail in the Risk Planning subsection of this section. A Project Risk Plan Template is available in Appendix B.

Information Technology Quality Planning

The IT quality planning process identifies the procedures and activities that the project team defines, plans for, and executes for quality management. It is recommended that a quality model be established and maintained by each state agency, and this model should describe the detailed quality procedures that are used for information technology.

The state agency's quality model should be based on standards and procedures that enable the quality manager to ensure quality throughout the life of the project.

Information Technology Communications Planning

It is interesting to note that communications planning and infrastructure is a very important component of successful IT projects. Consider the number of technical disciplines that may need to be involved with developing and executing a project. Often, the staff members who harbor needed technical skills come from different functional areas within an agency. Although the project should ideally be structured according to a matrix format (see Project Management Overview Section—Roles and Responsibilities), there is still quite a bit of communication that must take place between the project manager and the functional managers. A solid Communications Plan can help outline this process.

In addition, the scope of the Communications Plan reaches much further than the team that is working on the project itself. There are several stakeholders, including the customers, agency management, vendors, contractors, and other agencies (to name a few), who need to be considered when vital project status updates or information needs to be disseminated. The Communications Plan for the IT project needs to take all of the stakeholders

Information Technology Components for Project Planning

into account. Each stakeholder has different information needs, and the frequency at which they receive them will be different as well.

Discussion on project communications planning is contained in the Communications Planning subsection of this section. Example Status Report Template and the Communication Plan Template are available in Appendix B.

Information Technology Project Budgeting

It must be reiterated that working with IT projects involves skills similar to non-IT projects, but with much more attention paid to risk caused by diverse and changing technology. There is no area for which this is more true than when creating cost estimates and preparing project budgets.

Preparing a budget for an IT project is much the same as for any other project with respect to the steps taken in the approach. There are different types of cost factors, however, that may be associated with an IT project. For example, when working with new or developing technologies on an IT project, there may be cost factors such as subcontracting for services or skills not normally needed because the skills may not be immediately available from within the agency.

Furthermore, the cost of materials such as hardware and software are changing on a daily basis. Advances in technology and competition within the marketplace can affect prices on equipment and services dramatically from the time a Project Concept Document is created to the time the budget estimate is drafted to the time funds are spent on the project itself. The business and technology environment and the factors affecting it are the type of issues that a project manager must be aware of at all times.

Because of the issues described above, risk runs rampant in IT project budget estimating. The cost estimates should all be reviewed by the subject matter experts who are available within the agency and within the financial area as well. There are also several ways of obtaining information on costs for technology and services, such as databases and vendor contract pricing schedules. When possible, plan enough time to research your alternatives thoroughly for both labor and non-labor needs. Making quick or hasty decisions often means additional cost.

Detailed explanation and discussion of cost estimation and budgeting is available in the Project Budgeting subsection in this section. A Budget Estimate Template is available in Appendix B.

Information Technology Planning Summary

As has been stated many times throughout this subsection, IT project management is not all that different than "normal" project management. IT projects are technical and therefore need a different process, such as the SDLC Methodology, to support them. Keep in mind that IT project management is not about creating the technical requirements, specifications, or deliverables, but developing a process to make the whole effort easy to manage. Project management is about planning. To quote Peter Drucker, "Plans are worthless but planning is invaluable."

Sample Information Technology Work Breakdown Structure

WBS ELEMENT	TITLE	RESPONSIBILITY	DICTIONARY DESCRIPTION	STATUS
	IT Project			
	Project Management			
	Project Control		This element includes project planning, checking project status, issue tracking and management, reporting, and cost management.	
	Requirements Management		This element includes managing system requirements.	
	Configuration Management (CM)		This element includes providing CM products and services for the project.	
	CM Plan		This element includes developing the CM plan including procedures for baseline identification, change control, status reporting, and conducting CM audits and reviews.	
	CM Services		This element includes conducting CM activities described in the CM plan and obtaining requisite CM training required to perform CM functions.	
	Risk Management		This element includes providing risk management products and services to the project.	
	Risk Management Plan		This element includes developing the risk management plan. It does not include maintaining the plan.	
	Risk Management Services		This element includes providing risk management services to the project, including maintenance of the risk management plan.	
	Quality Management		This element includes providing quality management products and services to the project.	
	Contract Management		This element includes providing contract management services to the project.	
	Performance Measurement			
	Project Performance Measurement Plan		This element includes identifying project performance measurements and documenting the approach and mechanisms to validate performance against project and organization objectives.	
	Project Performance Report		This element includes the activities required to capture and report performance results against project and organization objectives.	
	Systems Engineering		This element includes systems engineering products and services to be delivered for the project.	
	Technical Alternatives Study		This element includes a study of alternatives for implementation including technical, cost, and schedule options.	
	Systems Architecture Document		This element includes overall systems architecture documentation including hardware, systems and application software, database (DB), and local area network/wide area network (LAN/WAN).	
	Backup and Recovery Procedures		This element includes developing and documenting backup and recovery procedures for data, application, and replication servers and client systems (as required) to ensure full operation of the system.	
	Database Management		This element includes all activities related to DB design and management.	
	Logical DB Model		This element includes developing version 1.0 of the logical DB model.	
	Physical DB Model		This element includes developing version 1.0 of the physical DB model, including the data dictionary.	
	Physical DB Structures		This element includes developing and maintaining physical data structures.	
	DB Services		This element includes coordinating DB changes with other projects as part of change control activities, supporting analysis and design activities related to DB models, writing SQL scripts, performance tuning as required, and updating logical and physical data models as a result of approved changes.	
	Hardware and Software		This element includes hardware and commercial-off-the-shelf (COTS) or developed software elements to be delivered on the project	
	Hardware		This element includes hardware to be procured or modified to support the project.	
	Development/Test Environment		This element includes procuring, installing, configuring, and testing the development and test environments (if these activities will not disrupt the environments and both environments are supported on the same machine).	

Sample Information Technology Work Breakdown Structure

	Operational Environment		This element includes modifying or procuring operational hardware required for the project. It does not include installing or testing the hardware.	
	Data Servers		This element includes modifying or procuring operational data server hardware required for the project. It does not include installing or testing the hardware.	
	Application Servers		This element includes modifying or procuring operational application server hardware required for the project. It does not include installing or testing the hardware.	
	Client Hardware		This element includes modifying or procuring operational client hardware required for the project. It does not include installing or testing the hardware.	
	Replication Servers		This element includes modifying or procuring operational replication server hardware required for the project. It does not include installing or testing the hardware.	
	Communications Infrastructure		This element includes procuring or modifying communications technology for WAN capabilities for the project.	
	Software		This element includes procuring or developing COTS software for the end-user system or development tools and the analysis, design, coding, and unit testing of developed software.	
	COTS		This element includes all COTS development software, system software, and application software.	
	COTS Operational Software		This element includes procuring COTS software for the operational environment. It does not include installation, configuration, or test activities.	
	Replication Software		This element includes procuring COTS replication software. It does not include installation, configuration, or test activities.	
	COTS Development Software		This element includes development software directly supporting design and coding activities.	
	Developed Software		This element includes analyzing, designing, developing, and unit testing software products.	
	Software Development Plan (SDP)		This element includes developing the SDP, which defines software development activities and the management approach to control them.	
	Functional Requirements Document (FRD)		This element includes analyzing, documenting, and approving the system's functional requirements.	
	Preliminary Design Document		This element includes analyzing, documenting, and approving the system's preliminary design.	
	Detailed Design Document		This element includes analyzing, documenting, and approving the system's detailed design.	
	Interface Control Document (ICD)		This element includes developing and maintaining the ICD, which provides detailed information on all required system interfaces.	
	Source Code		Elements include actual code development and unit testing activities.	
	Test		Elements under this section include system, integration, software quality assurance (SQA), acceptance, pre-production, and beta site testing activities.	
	Test Plan		This element includes documenting the strategy and detailed plan to perform system, integration, SQA, acceptance, pre-production, and beta site testing.	
	Test Procedures		This element includes creating and documenting detailed procedures to test all requirements defined in the FRD.	
	Test Results		This element includes activities related to conducting tests and documenting results to ensure all requirements have been formally tested.	
	Training		Elements under this section include training activities related to planning and training design, course material development, delivery, and support items as required to conduct system administration, end-user, and programming support training.	
	Training Plan		This element includes documenting the strategy and detailed plan to deliver training components for the system.	
	Training Design Documents		This element includes designing and documenting system administration and end-user training.	

Sample Information Technology Work Breakdown Structure

	System Administration Training Design Document		This element includes designing and documenting system administration training.	
	End-User Training Design Document		This element includes designing and documenting end-user training.	
	Training Materials		This element includes developing system administration and end-user training course materials.	
	System Administration Training Materials		This element includes developing system administration training course materials.	
	End-User Training Materials		This element includes developing end-user training course materials.	
	Training Course Delivery		This element includes conducting system administration and end-user training courses. This element includes all travel and costs associated with delivering training.	
	System Administration Training Delivery		This element includes conducting system administration training courses. This element includes all travel and costs associated with delivering training.	
	End-User Training Delivery		This element includes conducting end-user training courses. This element includes all travel and costs associated with delivering training.	
	Technical Training		This element includes training technical project team members as required.	
	Training Facilities and Equipment		This element includes acquiring training facilities and equipment and ensuring they are ready for use.	
	Data Conversion		This element includes activities required to convert existing data to the new environment including beta and other operational sites.	
	Data Conversion Plan		This element includes developing a plan to convert the data from the original system to the target system. This plan will incorporate all activities required to effectively convert the system and ensure the data is converted properly.	
	Conversion Software		This element includes COTS or developed software utilities required to convert existing data.	
	Conversion Data		This element includes executing conversion routines, manual data converting, and data loading converted data onto the target data server(s).	
	Site Implementation		This element includes developing and documenting a plan to implement the system at beta and operational sites.	
	Implementation Plan		This element includes defining a plan to implement the target environment into required beta and operational sites. The plan will incorporate all activities required to effectively implement the system at selected sites including proven integration with training and data conversion activities. Additionally, this element includes planning and conducting beta test activities.	
	Implementation Procedures		This element includes developing and documenting detailed procedures required to install the system at beta and operational sites. Included are detailed procedures to install data, application, and replication servers, as well as configuring client technology for proper connectivity to the system.	
	Site Surveys		This element includes site surveys to ensure requirements to support the system are identified and documented.	
	Beta Site Implementation		This element includes implementing the system at beta sites. Included is installing and testing all hardware and required software to support the system.	
	Operational Site Implementation		This element includes implementing the system at operational sites. Included is installing and testing all hardware and software required to operate the system.	

Figure 3.45
Sample Information Technology Work Breakdown Structure

PROJECT MANAGEMENT METHODOLOGY

SECTION 4 -- EXECUTION PHASE

Section 4: Project Execution

Table of Contents

Introduction

Overview

This section describes the events, roles and responsibilities, and process relationships within the Execution Phase.

Executing the Project Plan

This subsection defines Project Plan execution with respect to some of the activities that take place during the Execution Phase, such as information distribution, project administration, procurement, scope verification, and other project management efforts.

Risk Monitoring

This subsection describes the process of Risk Plan execution by reviewing risk assessment, identification, and control and then relating these activities with risk resolution strategies, activities, and responsibilities.

Status Reporting

This subsection relays the importance of accurate and timely status reporting and describes the information needs of stakeholders. A Status Report Template is also attached.

Information Technology Components for Project Execution

This subsection briefly describes the information technology elements that must be considered in order to execute system development life cycle types of efforts. It is also is a reminder that information technology projects differ from non-information technology projects in that they utilize more iterative processes in efforts to develop, test, implement, and document.

Overview

What Happens During Project Execution?

Once a project moves into the Execution Phase, the project team and the necessary resources to carry out the project should be in place and ready to perform project activities. The Project Plan should have been completed and baselined by this time as well. The project team, and specifically the project manager's focus, now shifts from planning the project efforts to participating in, observing, and analyzing the work being done.

Figure 4.1 depicts at what point in the Project Management Phases this section of the methodology will be discussed.

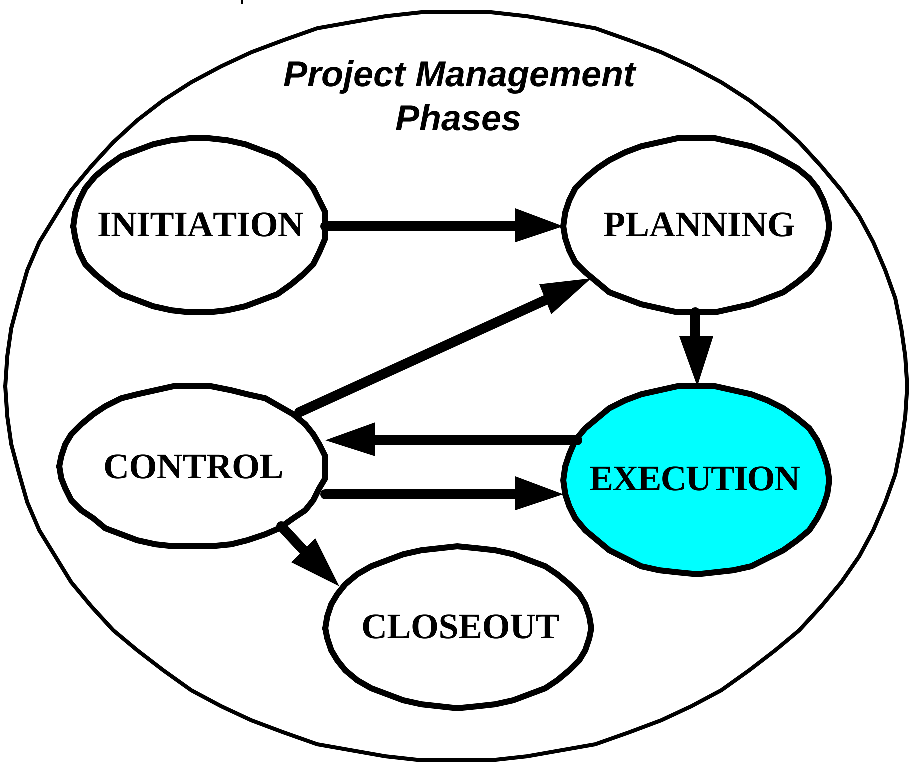

Figure 4.1
Project Management Execution Phase

Project Manager's Responsibilities

A project manager's responsibilities do not stop once the planning of the project is done. Because a project manager is responsible to internal and external stakeholders, the project team, vendors, executive management, and others, the visibility of the position is intensified because many of these people will now expect to see and discuss the resulting deliverables that were so meticulously detailed in the Planning Phase. As a project manager, keeping oneself from getting "down in the weeds," especially on large projects, will be important during project execution. This will allow the project manager to focus attention on enabling the project plans and processes and managing the expectations of customers and stakeholders.

Particular attention during project execution will need to be paid to keeping interested parties up to date with project status, dealing with procurement and contract administration issues, helping manage quality control, and monitoring project risk. While the processes to control many of these elements are discussed within the Project Control Phase, it is still important that the project manager be cognizant of the issues as the project is being performed. Daily interaction and feedback from team members will be vital to project success.

Relationships of the executing processes, of which the project manager must be aware, are depicted in Figure 4.2.

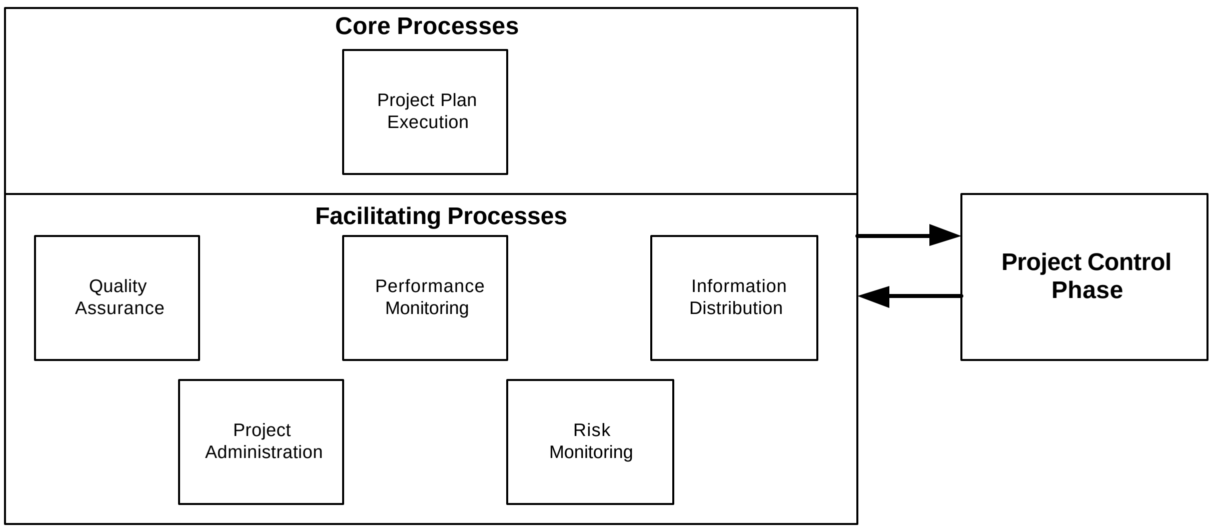

Figure 4.2
Relationships Among the Execution Processes

Quality Assurance

Quality assurance incorporates a process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards. Accordingly, while it is important that each team member be responsible for the quality execution of tasks, a quality team is typically included in the project team and plays an integral role in the execution of quality throughout the project. This team ensures that the quality plan is executed as planned. As an organization's quality processes mature, the need for the external quality unit decreases. This quality team reports functionally to the project manager, but must also have a reporting chain outside the project to facilitate problem escalation. Problem escalation is the process of moving a problem to a higher management level if sufficient attention is not given by the project manager. The independent reporting chain provides a check and balance on the project.

Project Team Responsibilities

The project team members are expected to assist in the management of the project as well, albeit at a more functional level. The critical project management elements for the project team to provide assistance with include the following:

Performance Monitoring
Implement an execution plan to measure actual performance as compared to planned performance. For example, actual project schedules will need to be reviewed periodically and compared to baseline schedules in order to discern whether the project is performing according to plan. If the project is not

Overview

performing according to the baseline (see variance in the Project Control Phase section), steps will be taken to get the project back on track. The same monitoring and analyzing will take place on budgets, quality, risk, scope, etc.

Provide Project Status

While the project manager is responsible for relaying project status to parties outside the project team, the project team is, in turn, expected to report status to the project manager. This includes communicating information on both a formal and informal basis. Formal mechanisms such as status report meetings and action item reviews can be very specific. Informal processes, such as hallway conversations, can be very helpful as well. More detail is provided on this subject in the Status Reporting subsection of this phase.

Executing the Project Plan

Executing the Project Plan

The project plan execution process ensures that planned project activities are carried out in an effective and efficient way while ensuring that measurements against project plans, specifications, and the original project feasibility concept continue to be collected, analyzed, and acted upon throughout the project life cycle. Without a defined project execution process, each project team would execute projects using its own best practices, experience, methods, certain control, tracking, and corrective action activities would be missed.

It is important to note that project execution relies heavily on the plans developed in the Planning Phase. There is already enough work to do within the Execution Phase of the project; therefore, having to reinvent ways of dealing with risk, change requests, training and resource issues, and other such obstacles to progress is impractical and undesirable at this point.

It is also critical during the Execution Phase that the project manager support and monitor the execution of other important project plans such as the Communications Plan, Risk Management Plan, and Procurement Plan via periodic interaction with the project team and stakeholders.

Information Distribution

Using Status Reviews for Information Distribution

The project Communications Plan is an important factor in the Execution Phase. A large part of a project manager's responsibility during execution is keeping the stakeholders informed of project status. Joint project reviews are a good way to bring visibility to all areas of the project. They provide an opportunity to discuss important issues and make management decisions on the project with input from several sources. Joint project reviews can involve the project manager, project team members, project stakeholders, and agency management, depending on the issues being discussed. The frequency and topics covered at these meetings should be outlined in the Communications Plan.

Benefits of Status Reviews

Examples of benefits of joint status review meetings include the following:

- "What isn't seen to be done isn't done"—Visibility of accomplishments is vital, and joint reviews allow all interested parties to acknowledge and approve milestones/accomplishments. Joint reviews also make team members feel more responsible for getting the work done.
- Parties must agree on the outcome (e.g., approval, disapproval, contingent approval) of the review and any action items as a result of the review. The best way to reach agreement is to get both parties together in a formalized, planned manner.

Status Templates

The status template is available later in this section and in Appendix B.

Project Administration

Project administration is initially considered during the Project Planning Phase when the Project Plan is created. During the Execution Phase, the Project Plan is implemented and modified as necessary.

Project Plan modifications may result from such things as the following:

Executing the Project Plan

- New estimates of work still to be done (generated as more detailed information is known about outstanding work)
- Changes in scope/functionality of end product(s)
- Resource changes
- Unforeseen circumstances

In addition to keeping the Project Plan current, project administration involves monitoring the various Execution Phase activities (and aiding them as appropriate), monitoring risks, reporting status, and reviewing/authorizing project changes as needed.

The following is a list of documents and procedures that might be helpful in identifying the cause of project problems and taking action to eliminate/prevent them:

- Corrective and preventive action procedures
- Tracking time spent on project activities by team members
- Timesheet recording procedure
- Timesheet forms
- Status reporting by team members
- Project status reporting to management

Procurement

Executing the Procurement Plan

As stated in the Planning Phase of this methodology, there will be times within the Execution Phase when an agency may have to go outside its resource pool to purchase products or services needed to deliver the project. In these cases, the project Procurement Plan will be put into action. State agencies will have a defined set of guidelines and policies that provide the infrastructure for project purchasing that should be integrated within the Procurement Plan. These guidelines will outline the policy for solicitation, source selection, and contract administration. Although the solicitation and contracting responsibilities may not always be managed by the project manager, it is still important that the project manager have a fundamental understanding of the agency's contracting and procurement policies.

Project Manager Responsibilities

The project manager's responsibility in the Execution Phase is to provide input into new product requirements for the services or products that were not planned for in the Planning Phase. In addition, the project manager will be responsible for ensuring that the vendors, once contracted to do the work, meet the contractual agreements specified within their contracts. Project managers will also be responsible for tracking, reviewing, and analyzing the performance of contractors on a project. This performance reporting will be the basis for any contractual changes that need to be made during the life of the contract. Finally, project managers will play an important role in oversight and review of any contract changes that will affect the project.

Scope Verification

Scope Verification Defined

Scope verification is the project management responsibility that focuses on ensuring that the products created during the Project Execution Phase are

Executing the Project Plan

correct and meet agreed upon requirements. This may sound similar to quality control, but according to the Project Management Body of Knowledge, "Scope verification differs from quality control in that it is primarily concerned with the acceptance of the work results while quality control is primarily concerned with the correctness of the work."

How Is Scope Verified?
The baseline for the creation of any deliverable is the baseline scope plus or minus any agreed upon changes (see the Project Scope Control subsection). Falling short of or going beyond the agreed upon scope will jeopardize the acceptability of the deliverable. Scope verification is achieved through inspection or formal reviews of the deliverables. Once a project deliverable is accepted by the customer, a formal acceptance document should be drafted and signed stating such.

Schedule Data Collection and Validation

The procedures defining the process to update schedules to depict current work efforts are key to ensuring that accurate schedules are maintained. Without these procedures, invalid data may cause inaccurate schedule performance reporting. Data collection and validation involves the following steps:

- Collecting and validating schedule status; for example, data that reflects start, finish, and estimates to complete work.
- Validating data attributes and associations used to report schedule information; for example, task relation to the work breakdown structure, project phase, functional organization, or integrated master schedule.
- Validating work effort to ensure that the schedules accurately depict the way work is being accomplished and reported.

The validation technique will improve management control by improving the information reported. The implementation of specific techniques should provide this benefit without burdening those responsible for project delivery.

For more information on schedule maintenance, refer to "Schedule Control" in the Project Control Section of this methodology.

Other Aspects of Project Plan Execution

Following are some other issues that project managers will want to pay attention to when executing the Project Plan and the other associated project management documents.

Document the Work Results
Results are the outcomes of the activities performed to accomplish the project. Information on work results provides input on which deliverables have been completed and which have not; to what extent quality standards are being met; and what costs have been incurred or committed. These valuable data need to be collected and fed into an agency performance reporting process.

Apply and Document Organizational Policies
All agencies that develop and execute projects have formal and informal policies that may affect Project Plan execution. Project execution may also

Executing the Project Plan

lead to the realization of the need for new polices or alteration of existing policies. Any consideration for new agency policies and procedures should be documented during the Execution Phase and reviewed for implementation.

Work Authorization

A work authorization system is a formal procedure for sanctioning project work to ensure that work is done at the right time and in the proper sequence. The primary mechanism is typically a written authorization to begin work on a specific activity or work package. The design of a work authorization system should balance the value of the control provided with the cost of that control. Work authorization systems can be unique to a particular agency or functional area within an agency. Therefore, project managers must be aware of how the work will be initiated when working on interdepartmental or interagency projects.

Risk Monitoring

Risk Monitoring

Risk identification, monitoring, and resolution are key tools for successfully completing a project. Part of controlling a project during the Execution Phase is to have an established risk management process. This process is a primary part of project planning (see the Risk Management Planning subsection of the Project Planning Phase section) and is kept current until project closeout. The key elements in this process are as follows:

- Creating a central repository for risk information and associated documentation of risk items and resolution strategies
- Summarizing information on a risk form
- Assigning a risk manager, who should be either the project manager or a member of the status tracking/reviewing team (this assignment should have been done at project baseline, but definitely by the early days of performance)
- Including a risk summary in the regular status meetings
- Providing a consistent and ongoing evaluation of risk items and development of risk strategies:
  - Identifying the risk
  - Evaluating the risk
  - Defining a resolution strategy

What Comes After Risk Assessment?

The risk control process is created in the Project Planning Phase and baselined and fully maintained during project execution. Provided in the Project Planning section is one view of a risk model that can be used for this process. The Risk Management Plan template can be found in Appendix B. The key is not the format of the data, but that a plan is developed, baselined, and kept current during the Execution Phase.

It is important to mention that risks are not events that have occurred, but rather events that might occur that would adversely affect the project. Events that have occurred and are affecting the project are addressed in the change management process in the Project Control section.

The Evolution of Risk Control

As a project evolves through the various project management phases, the ability to define and specify the risk items increases. This is because more is known about the project and the associated issues.

During the Execution Phase, risks are more defined, and tangible resolution strategies emerge. This allows for the development of realistic contingency plans, including specific action plans. These actions must then be tracked. The actual format for the Risk Management Plan may need to reflect these activities. Some projects may, for example, want to allow room to show the assignment of a risk item on the risk form.

Risk Monitoring Is an Iterative Process

In all cases, risk management is an iterative process that is performed throughout the project. Risk management examines the risk and its potential impact on the project and defines actions to eliminate or to mitigate the impact of that risk, should it occur.

The process starts with the risks identified in the Project Plan and the first

Risk Monitoring

definition of resolution strategies. There are typically four types of resolution strategies:

- ***Eliminating* or *avoiding*** the specific threat, usually by eliminating the cause. The project team can never eliminate all risk, but specific risk events can often be avoided through careful planning.
- ***Reducing*** the expected cost associated with a risk through **mitigation**. This is a mathematical solution to containing the risk impact on a project. In some ways it can be seen as "insurance."
- ***Transferring/deflecting*** the expected risk via insurance, negotiation, with key stakeholders, or by other means. Insuring the agency or department against the occurrence of a risk event reduces the potential financial liability should an incident occur.
- ***Accepting*** that a risk will occur and developing contingency plans should the risk event occur. The budget can be increased to deal with a specific risk item and/or the schedule can be modified.

The risk management process, which is defined in the Risk Planning subsection, is a cyclical and iterative process, includes four overlapping steps:

- Risk Identification
- Qualitative and Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control

The risk control cycle is shown in Figure 4.3.

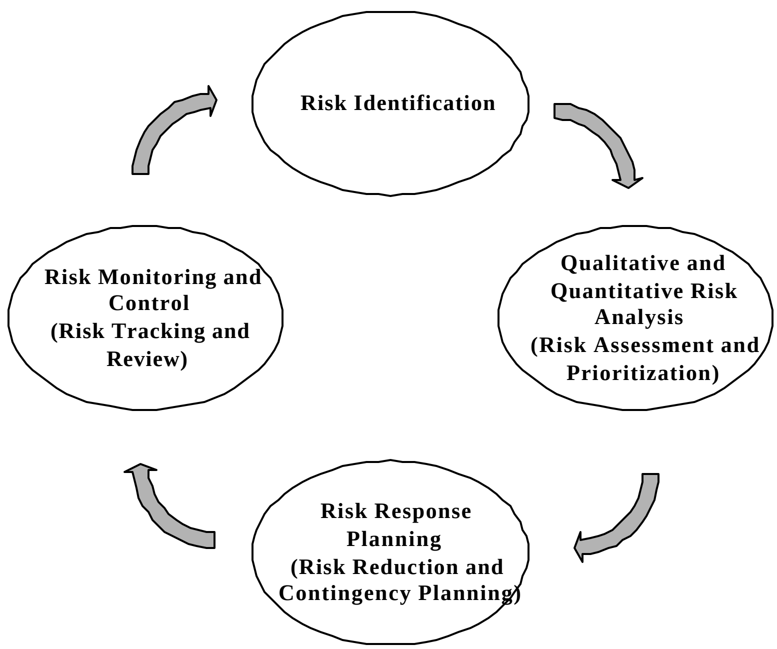

Figure 4.3
Risk Control Cycle

Risk Monitoring

Risk Manager

Risk control responsibility is assigned in the Planning Phase and is documented in the Project Plan. The risk manager is responsible for ensuring that risk management is performed throughout the project. This person may be the project manager, although in most large projects this is not the most advisable approach. It is primarily a workload issue.

During the Project Planning Phase, the functions may be performed by the project manager. In implementation, risk management may require a separate (full-or part-time) position to handle the workload.

The risk manager should:

- Have enough seniority in the project organization structure to request that specific risk contingency plans be assigned and staffed
- Attend project management status meetings
- Have an understanding of the overall project

The identity of the risk manager should be publicly announced and should also be reflected in the organizational breakdown structure. In most cases, the risk manager will also be fulfilling another management or lead technical role on the project team. A risk management box may be assigned, and names will be repeated for different functions.

An example of such a chart is shown in Figure 4.4. Some project managers update the organization chart to indicate those who will be attending the project status meetings, risk meetings, and change control board meetings—as shown in this example.

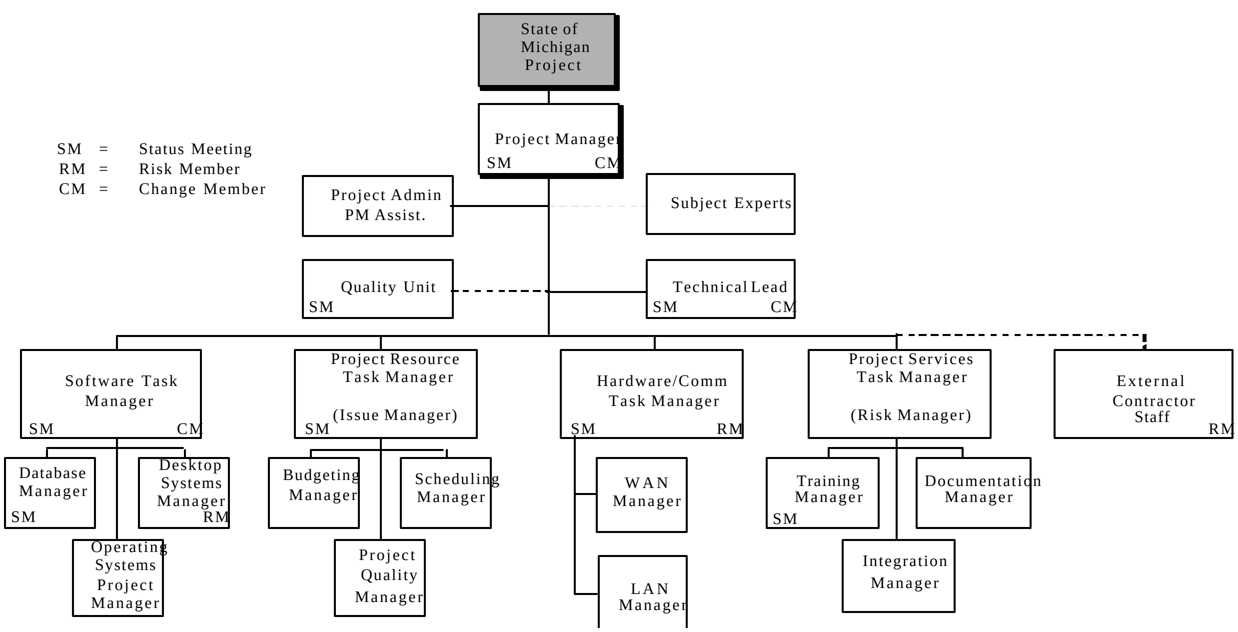

Figure 4.4
Sample Organization Annotated

Risk Monitoring

Risk Meetings

The risk process is ***not*** just completing the risk assessment form during project planning and then forgetting about it. Risk management, of which risk control is part, is a process that involves all members of the project team and occurs throughout all project management phases. Risk meetings are part of, and contribute to, the process of identifying risks and developing ways to approach the risks. These are especially helpful on high-risk or complex projects.

- **Risk Identification Meetings.** It is during this process that the current risk list is reviewed and updated.
- **Executive Review Meetings.** A summary of the top risk items for the project is included in the executive project review meeting. The summary should be no more than one page in length and should list the risk, state the defined resolution, and indicate the current status.
- **Project Status Meetings.** On a regular basis, the individual responsible for risk should report to the project status group on the current status of project risk. There should be a written summary, preferably using the actual risk form, including information on all contingency plans currently under way.

Ongoing Risk Identification

The initial list of risks that begins with the project will evolve over time. Risk identification meetings should be held to ensure that new risks are added and resolved risks are eliminated. Frequency is based on the size of the project and the "perception" of the project team and key stakeholders as to the degree of risk that exists for the full project.

The format for these meetings should be open and interactive to facilitate a wide consideration of risk areas. Some suggestions on meeting format include the following:

- Brainstorming
- Breakout sessions
- Other meeting approaches that encourage the free flow of information

The starting point for this meeting is the previous risk list. Additionally, some general areas should be considered. The group should be given some ground rules in terms of the degree of risks that will be tracked and ways to eliminate or include risk items. Some criteria for risk tracking include time frame (when it would possibly occur) and value (what would be the cost if it occurred). The risk manager should provide this information to the group.

From this meeting, the risk manager will have an updated list of risks. The group assists in the process of prioritizing the risks by determining the probability of their occurrence and the impact these risks could have on the project. Specific procedures for risk management are defined by the project manager, risk manager, and project team.

Note: Current problems are not to be considered, as these are issues for the change and issue management process.

Risks must be prioritized to ensure that key risks are addressed. Be careful

Risk Monitoring

not to identify so many minor risks that major risks are buried. The basic ground rules for prioritization are the following:

- There should generally be about five to ten risks being worked at any one time. These should be the risks with the highest probability of occurring. For very large projects, each subsystem or major activity may be tracking this number of risk items.
- The list of actively monitored risks should generally be no longer than a single sheet. Keep a separate list of lower priority risks so that they can be reviewed at future risk identification meetings.
- Select the risk items that have the greatest possible impact on cost or schedule.
- The prioritization process starts with the group that identified the risk, but also includes the project manager, key stakeholders, and executive management.

From this risk identification process, the risk team determines the following three elements that characterize a risk:

- **Risk event –** a statement of what might happen in the project.
- **Risk probability –** how likely the event is to occur.
- **Amount at stake –** the severity of the consequences should the risk occur.

A very simplistic approach to getting a prioritized list of risks would be to conduct the following calculation:

Risk Event Value = Risk Probability x Amount at Stake

It is impossible to give a hard and fast rule on what method should be used for prioritization, because this is a process that needs to be driven by the actual project. As members of the project team work with the risk management process, they will get more proficient at knowing what should be considered as the top risk and which risks need the most attention at what time.

Risk Resolution

For the “top risk” items, mitigation/resolution strategies must be developed. From the steps above, a view of the risk is developed, which includes where, when, and to what extent the risk will affect the project.

With these factors identified, the following options can be considered:

- ***Eliminating*** or avoiding the specific threat, usually by eliminating the cause. The project team can never eliminate all risk, but specific risk events can often be avoided.
- ***Reducing*** the expected cost associated with a risk through mitigation or transfer. This is a mathematical solution to containing the risk impact on a project. In some ways it can be seen as a transfer.
- ***Accepting*** that a risk will occur and developing contingency plans to be executed should the risk event occur. It could include increasing the budget to a threshold for specific risk items.

Risk Monitoring

Eliminate
Eliminating a risk usually involves taking specific action to change a planned event in the project. If a risk is identified that will occur if the project continues on its current course, the option is to change the course. Risk elimination depends on the extent of change that would be required to the overall Project Plan, considering the cost (in terms of dollars and/or time) to make the change and the calculated severity of the risk should it occur. As a general rule, avoidance/elimination should be pursued when the risk cannot be managed away or it will be costly to the project.

Mitigate
The area of reducing risk is the most familiar resolution approach used during the planning process. Risk reduction is also termed "risk mitigation", and it involves developing reserves. It is defined as a set-aside of project dollars and schedule for covering the problems that a risk event would cause.

Transfer
The potential impact of a risk event can be transferred using various options such as insuring a product or department against the liability of damage. By doing this, the responsibility of damages incurred is placed on an external organization for a fee.

Accept
A risk contingency plan can be developed for the project that defines the actions taken, the resource plans, and the factor(s) that triggers an action, should a given risk occur. Contingency plans are predefined action steps to be taken prior to an identified risk event.

Historical Record

It is always a good idea to maintain a history of the project risks. This information can be used as lessons learned, and the project team can benefit from reviewing past risks and occurrences.

Status Reporting

Status Reporting

A standard requirement of all projects is to provide reports to both executive management and the project team. Although the frequency of the reports may sometimes vary, they should correspond with the executive meetings or when the project manager deems necessary. For executive management reports, this typically is on a monthly or quarterly basis or at a major project phase or milestone completion. The project team should receive Status Reports on a weekly, or biweekly, basis by key project team members. The responsibilities in the areas of Project Execution should be clear to all team members.

Another key in status reporting is to keep the report due date consistent (i.e. every Monday at 1pm). This makes it easier for the team members to complete their reporting.

Status reporting is an integral part of the project management process. It is the means by which the project team, the contractors, and executive management stay informed about the progress and key activities required to successfully complete the project. The purpose of the Status Report, such as status meetings, is to develop a standard format for the formal exchange of information on the progress of the project.

The information shared in the Status Report should be in a consistent format throughout the project (see the Status Report Template below as an example). The types of reports that a particular agency uses may vary.

The project team should prepare Status Reports detailing activities, accomplishments, milestones, identified issues, and problems. Some level of recovery plans should be prepared for activities that are not on schedule, and abatement plans should be prepared for anticipated problems.

The Status Report Template is used to communicate the following key information:

- Current activity status
- Significant accomplishments for the current period
- Planned activities for the next period
- Financial status
- Technical status/issues
- Previous action items
- Last risk update/status

Along with the status report form, the following may be attached:

- Updated Gantt charts
- Recovery plans for activities not on schedule—defined by the project team as being late (e.g., slippage in the critical path activities)
- Corrective action plans for expected problems
- Resolution to assigned action items (including the issues and action process)

Status Report Template

State of Michigan
(Insert Agency Name Here)
Project Status Report

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name: ______________ ***Date:*** ______________

Controlling Agency: ______________ ***Modification Date:*** ______________

Prepared by: ______________ ***Authorized by:*** ______________

Project is: ☐ **On Plan** ☐ **Ahead of Plan** ☐ **Behind Plan**

Reporting Period: **From:** **To:**

B. Current Activity Status

Attach any relevant Change Control Requests.

The description of activity should not span more than 2 to 3 lines. Activities should be linked to the project tasks list or Work Breakdown Structure.

C. Significant Accomplishments for Current Period

A summary of the significant accomplishments and project deliverables during the reporting period.

D. Planned Activities for Next Period

The description of activity should not span more than 2 to 3 lines. Activities should be linked to the project tasks list or Work Breakdown Structure.

E. Financial Status

Covers planned versus actual costs and budgets.

	Planned (to date)	Actual (to date)
Costs		
Schedule		
Staffing		
Estimate to Complete (ETC) Review		

Status Report Template

Estimate at Completion (EAC) Projection		

F. Technical Status/Issues

Identify technical issues impacting the project. Attach any relevant Issues Documents to this status report.

Discusses any relevant technical issues at this point in the project.

G. Previous Action Items

Covers any open action items from previous status reports.

H. Last Risk Update/Status

Covers any risk status reports since the last status report.

Information Technology Components for Project Execution

Information Technology Project Execution

Information technology project execution is very similar to non-information technology project execution. For the most part, project managers will be expected to perform the same reviews and analysis as mentioned previously in the Execution Phase. The only major difference between the two types of projects, from a manager's perspective, is the iterative processes that information technology projects go through during their development, testing, implementation, and documentation cycles.

To clarify, the following definitions describe the System Development Life Cycle (SDLC) components of the Execution Phase. Development is the actual work performed to develop the information technology project. Testing is the actual test of the products or processes created within the Development Phase. Implementation involves putting the tested and approved products into an operational environment for use by the customer. Documentation includes the creation of written operations manuals, standards, systems outputs, and performance reports that document the requirements and use of the product. All of these components combined provide the basis for the SDLC within the Execution Phase of the Project Management Methodology.

Typically, information technology projects are not created, completed, and delivered all at once, as are many non-information technology projects. Information technology projects (especially software development), because of the nature of their development, may go through several releases, sometimes known as "beta versions". Because of these types of development cycles that are found in the SDLC, processes that are carried out several times have the potential to become repeatable and manageable processes. Not only does this facilitate management of these projects, but it also provides a foundation for developing the agency’s processes within the Capability Maturity Model (see CMM Overview description in Appendix C).

Information Technology Contract Administration

Project managers within information technology projects tend to manage more contracts than non-information technology projects. This is primarily because of the need to bring in contractors that have expertise in particular technology areas. Therefore, monitoring status and metrics set for the different contractors can become a greater responsibility. More information on the contract administration aspects of the Execution Phase can be found in the Executing the Project Plan subsection of the Execution Phase.

Information Technology Risk Management

Risk management, which is described in some detail in the Risk Monitoring subsection of the Execution Phase, is of much greater concern to the information technology project manager than to the non-information technology project manager. Information technology project managers may be responsible for projects that are working with undeveloped, or unproven, technologies. In the race to keep the agencies and departments ahead of the technology curve, project managers will have to engage their teams in projects that may have tight budgets, limited schedules, and high customer expectations.

The other risk issue is the development and implementation of information technology equipment and software that might become obsolete very quickly. Technology, as mentioned several times, is moving at an alarming

Information Technology Components for Project Execution

rate with its increases in speed and capabilities. Accordingly, risk is increased when implementing high-dollar or homegrown technology systems. To alleviate this issue, the project manager must make sure that the efforts of the project team are aligned with the technology and business strategy of the agency. Researching future needs, capabilities, and integration requirements of the products will be helpful.

Responsibility Reminder

Information technology project managers are not expected to know all about the technology to the n^{th} degree. Their responsibility is to provide vision and planning for long-term success. The captain of the team cannot play every position, but he or she must know how every position is played.

PROJECT MANAGEMENT METHODOLOGY

SECTION 5 -- CONTROL PHASE

Table of Contents

Section 5: Project Control

Introduction

Overview

This section defines and describes project control and the areas project control affects, as well as the process relationships within the Control Phase.

Configuration Management

This subsection describes at a high level what configuration management is, when it should be used, and how it is different from change control.

Change Control Systems

This subsection defines change control and discusses at great length the different process areas in which change control is applied, including scope, schedule, risk, quality, cost, and contract administration.

Change Control Process

This subsection describes the change control process in detail and reviews the four specific process phases associated with it. A Change Control Template is included.

Issues Management Process

This subsection describes the issues management process in detail and reviews the four specific process phases associated with it. An Issues Template is included.

Information Technology Components for Project Control

This subsection briefly describes considerations in information technology that should be realized because of the variability in System Development Life Cycle (SDLC) efforts. Information technology projects often deal with unknown or unproven technologies, control during the scope, scheduling, and costing of these efforts needs to be carefully scrutinized.

Section 5: Project Control

Overview

The Formality of Project Control Within This Methodology

"Project control" is a formal process in project management. Therefore, in most respects there is not a lot of room for creative license. The Project Management Body of Knowledge makes several recommendations on project control that will be referred to extensively throughout subsections in the Control Phase. Nevertheless, all of the control processes presented are applicable to the State of Michigan Project Management Methodology.

The overview of the Project Management Phases is depicted in Figure 5.1.

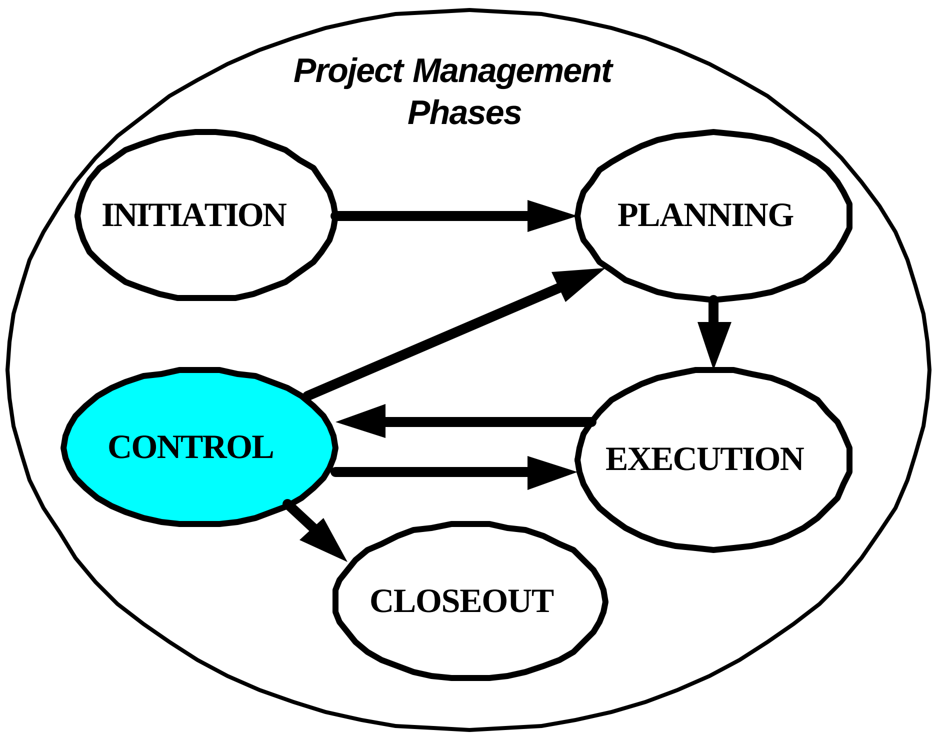

Figure 5.1
Project Management Control Phase

Project Control Defined

The Project Management Body of Knowledge defines Project Control as follows:

> *A project management function that involves comparing actual performance with planned performance and taking corrective action (or directing or motivating others to do so) to yield the desired outcome when significant differences exist.*

<u>How Project Control Works</u>

Project control involves the regular review of metrics and report status in order to identify variances from the planned project baseline. The variances are determined by comparing the actual performance metrics from the Execution Phase against the baseline metrics assigned during the Planning Phase. These variances are fed into agency control processes to evaluate their meaning. If significant variances are observed (i.e., variances that jeopardize the completion of the project objectives), adjustments to the plan are made by repeating and adjusting the appropriate project planning

Overview

processes. A significant variance from the plan does not explicitly require a change, but should be reviewed to see if preventive action is warranted. For example, a missed activity finish date may require adjustments to the current staffing plan, reliance on overtime, or trade-off between budget and schedule objectives. Controlling also includes taking preventative action in anticipation of possible problems.

While the Project Control Phase's relationship to other project phases is relatively concise and clear, control is often difficult to implement as a formalized project control system in an agency. Project control is still important, however, because a project is unlikely to be considered successful by stakeholders if it is not controlled effectively. Success in this context translates to raw metrics (project cost, completion date, etc.) and customers' expectations (features, functionality, performance, etc.).

Impact of Project Control

Only by controlling a project can project progress and stakeholder's expectations be satisfied in unison. Projects rarely fail because of one issue. Rather, failure is usually a collection of minor items that individually have negative impact in a specific project area. However, when looked at over the life span of a project, these minor items can cause significant impacts to cost, schedule, risk, and functionality and can manifest themselves as deviations from the original Project Plan.

Areas of Control

In the other subsections of the Control Phase, the basic concepts of control related to scope, change, schedule, cost, risk, and contract administration will be reviewed. While the principles are straightforward, it must be recognized that the implementation and execution of the control functions must be accomplished with a clear understanding of the following:

- **Agency Organizational Structure** – The project team members and stakeholders are interrelated in the agency.
- **Agency Project Management Experience** – Most control systems require all members of the project team and stakeholders to have a basic understanding of the control structure and how the project will be managed.
- **Agency Commitment –** Control structures, while key to a project's success, do not come free. All of the control structures, regardless of implementation, will require commitment of agency staff. If management is unwilling to commit and enforce the control systems developed, the risk of project failure is increased.
- **Agency Maturity –** Agencies must learn to crawl before they can walk when developing control systems. It is unrealistic for an organization to shift from a very loose or undefined control structure to a very strict and structured change control system without an increase in senior management attention and development of a staff that is committed to implementing the new system.

When Project Control Works

The Capability Maturity Model, addressed in Appendix C of this methodology, is predicated on the understanding of the organizational dynamics explained above. The agency's understanding and maturity of control must move forward simultaneously. One person, or a small group, may have more maturity than others, but most projects require the entire project team to understand the benefits of control as well as the risks of unmanaged change before formal control systems can be used on agency projects.

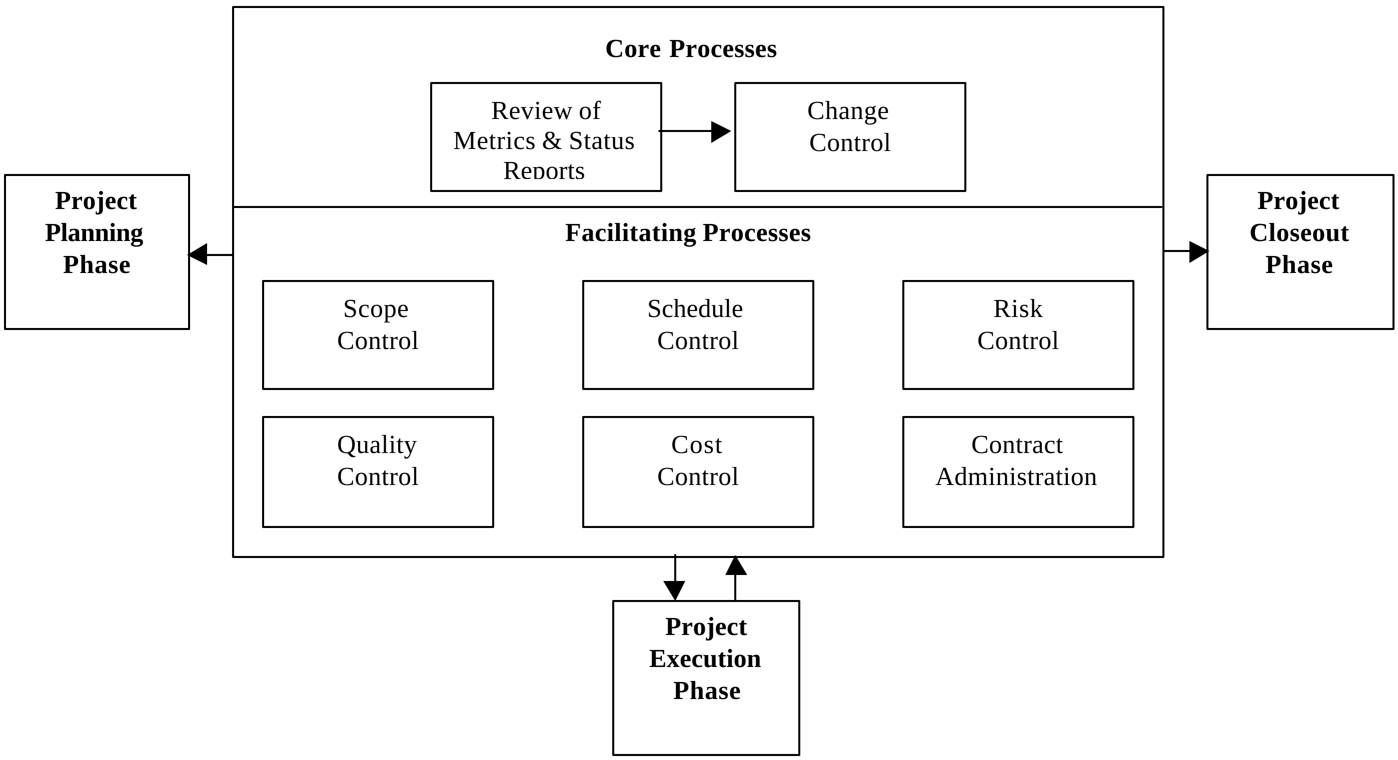

Figure 5.2
Relationships Among the Control Processes

Configuration Management

Configuration Management

Configuration management can mean a lot of things to different people. Entire books have been written on configuration management and the processes necessary to implement it. For the purpose of this discussion, configuration management will be explained at a very high level, and the following definition will be used:

> The technical and administrative application of configuration control.
>
> It includes the maintenance of a configuration control unit, change and version control standards, and configuration of control facilities.
>
> Configuration Management is a formal discipline that provides project team members and customers with the methods and tools that are used to identify the product developed, establish baselines, control changes to these baselines, record and track status, and audit the product.

When to Use Configuration Management

Like change control, implementation of configuration management processes should be carried out on all projects, especially large or complex projects. In short, configuration management is a necessity. Configuration management processes should be implemented at the agency level to ensure a consistent general approach, with consideration given to the special functions or needs of the project itself. The complexity or size of the configuration system is less important than its functionality and intent.

Configuration Management Versus Change Control

Configuration management, in many application disciplines, is considered part of change control, while those in other disciplines consider configuration management to describe any rigorous change control system. The exact relationship of configuration management to change control is not critical. In this document, configuration management relates to the management of the physical features, functionality, and documentation of hardware and software used in a project. As was mentioned in the Overview section of this methodology, configuration management is a disciplined procedure that is established for controlling and documenting the functional and physical characteristics of the products being designed or produced. Conversely, change control is a more encompassing term that addresses scope, requirements, cost, schedule, and other facets of project management.

Change Control Systems

Change Control Systems

Before reviewing the specific elements of change control, it is helpful to clearly explain what change control entails. Change control is the following:

- Influencing the activities that create changes to ensure that those changes are beneficial
- Determining that a change has occurred
- Managing the actual changes when they occur

Change control is not the prevention of changes. It is concerned with identification and management of possible changes to the project. Management of the changes includes the administrative management, tracking, review, and assessment of proposed changes; the organized and timely review and decision on change approval; and the administrative process to ensure that the project team is informed of changes when they are approved.

Basic Change Control Concepts

In the previous methodology phases, the concepts of project scope, schedule, and requirements were discussed. Change control is relevant to all of these. Overall, change control requires the following:

- Maintaining the integrity of the performance measurement baselines. All approved changes should be reflected in the Project Plan, but only project scope changes will affect the performance measurement baselines.
- Ensuring that changes to the product scope are reflected in the project scope.
- Coordinating changes across knowledge areas. For example, a proposed schedule change will often affect cost, risk, quality, and staffing.

At key points in the project timeline, all Project Plan items are baselined. Once they are baselined, changes to the baseline are managed through a formal change process.

Baseline

The baseline process, while key to project control, is often misunderstood. A baseline is defined as *the original plan, for a project, a work package, or an activity, plus or minus approved changes. A modifier (e.g., Project Budget Estimate, schedule baseline, performance measurement baseline) is usually included.*

A Baseline Is a Ruler

A baseline provides the “ruler” by which a project can be evaluated. If the schedule baseline plan indicates that you should be 30 percent finished with an activity at a specific point, and you are 15 percent or 90 percent finished, you have a variance. But only by further investigation can an opinion be formed on the significance or overall importance of the variance.

Baseline Changes

Baseline changes are significant events and should not be made without consideration of their impact. Baseline changes are only made to reflect a change in project scope, not just when the project is behind schedule. A baseline change adjusts the ruler for the project. A variance *does not* justify a baseline change; it only indicates that the initial plan was not accurate. Baseline change should be handled through a normal change control process.

Change Control Systems

Baseline Control

Each individual agency may have its own change control process. However, if an appropriate system is not available to adapt to the project, the project management team will need to develop one. The detail and exact procedures of a change control system may be created in many different forms balancing resource availability and risk. Guidance from the Project Management Body of Knowledge and other best practices maintain the following:

- A change control system is a collection of formal, documented procedures that defines the steps by which official project documents may be changed. It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes.
- Many change control systems include a Change Control Board (CCB), or other panel, responsible for approving or rejecting change requests. The power and responsibilities of a CCB should be well defined and agreed upon by key stakeholders and the managing agency. On large, complex projects, there may be multiple CCBs with different responsibilities.
- The change control system must also include procedures to handle changes, which may be approved without prior review (e.g., changes that occur as the result of an emergency). These changes must still be documented and captured so that they do not cause problems later in the project.

Scope Control

Scope Control Defined

Scope control is a straightforward concept. The intent of implementing a scope control process is to identify and manage all elements (e.g., people and requirements) inside and outside of the project that increase or decrease the project scope beyond the required or defined need of the original, agreed upon Project Scope Statement.

Attributes of Scope Control include:

- Influencing the factors that create scope changes to ensure that the changes are beneficial
- Determining that a scope change has occurred
- Managing the actual changes when and if they occur

Scope changes will come from the perceived need for a change in a project deliverable that may affect its functionality and in most cases the amount of work needed to perform the project. A scope control change is a very crucial occurrence.

Scope Control System

A scope change most likely will require additional project funds, resources, and time. Therefore, a committee that consists of stakeholders from all areas of the project should be willing to convene and discuss the potential change and its anticipated impact on the project and the agency. This group of stakeholders should be a predefined cross section of people that will have the ability to commit their interests at a strategic management level. Once a decision is made to increase or reduce scope, the change must be authorized by all members of the committee. Any changes that are agreed upon must be documented and signed as a matter of formal scope control.

Change Control Systems

In addition, the impact of the scope change will be felt throughout the Planning Phase processes and documents. Documents such as the WBS and Project Schedule will have to be re-evaluated and updated to include the scope change impacts. Scope changes need to be communicated clearly and effectively to the project team by the project manager. Team members will want, and need, to understand how the scope change affects their roles in the project.

Inputs to Scope Control

The inputs to baseline project scope include documenting the requirements and objective of the project. Sources of this documentation are customer requirements, business case materials, and other documents developed in the planning processes and utilized during Project Execution. They include the following:

- Work breakdown structure
- Performance reports
- Change requests
- Project Scope Statement

A work breakdown structure, as described in the Planning Phase, will organize and help clearly define the total scope of the project. With the successive decomposition of deliverables into smaller work packages, it should serve to develop and clarify a common understanding of the project goals and objectives between stakeholders.

Performance reports, created as part of the Execution Phase, will provide information on scope performance measured against the plan. The resulting variances are reviewed and interpreted to determine if there is a need for corrective action. These reports will also provide information on the progress of interim products and deliverable completion.

Change requests may occur in many forms—oral or written, clear or subtle, internally or externally driven, operation or regulatory requirements, or driven by technology limitations. The problem, as stated earlier, is not that changes occur, but that changes go unmanaged. Changes in scope may be an expansion or reduction in scope of the project. Most change requests in scope are the result of the following:

- An external event (e.g., a new regulation—a law that requires a change in how payments are determined);
- An error or omission in the original definition of scope of the product (e.g., failure to include electronic funds transfer as a payment option);
- An error or omission in the defining of the scope of the project (e.g., failure to include training in the project implementation); or
- A value-adding change (e.g., use of Internet access versus dial-up telecommunications).

The Project Scope Statement includes a section that describes how changes in project scope are to be handled. The Project Scope Statement is normally included as part of the Project Plan. While agencies may have general guidelines, the basic needs of the "Approach" section of the Project Scope Statement should address the following:

Change Control Systems

- How scope changes will be identified and documented
- How scope changes will be approved and by whom
- How often scope changes will be made and accepted
- The point at which the approval of scope changes must be approved at higher levels (e.g., after beta testing of a billing system, no scope changes will be made without the approval of the agency chief information officer)

Tools and Techniques for Scope Control

While every product and project is unique, they often can be decomposed into many similar work elements and life cycles. WBS templates exploit this feature to help project teams decompose a project—simple or complex—into the same or similar deliverables required under each project phase.

For agencies or organizations just starting to use project control tools and work breakdown structures, the use of a template simplifies project planning. It provides a starting point for scope control to allow the team to consciously decide that an element does not apply to the project, rather than starting with a blank sheet of paper. A sample WBS is provided in the Planning section of this methodology.

Decomposition is the further subdivision of WBS elements into smaller, more manageable components until the deliverables are defined in sufficient detail to support further project activities (planning, execution, control, and closeout).

Outputs from Scope Control

The scope definition produces the baselined project WBS. It will be used as an important input to many other project management products. During the Execution Phase, the integrity of project scope must be guarded to prevent either an unapproved increase or decrease in the scope of the project.

By following the procedures outlined in the Approach Section of the Project Scope Statement, scope changes should be submitted, reviewed, and decided upon in a timely fashion. Changes, if approved, must be effectively and clearly communicated to the team to prevent conflicting work. Approved changes will normally include change to various baselines, and their effect should never be underestimated.

Schedule Control

Attributes of Schedule Control include:

- Influencing the factors that create schedule changes to ensure that changes are beneficial
- Determining that the schedule has changed
- Managing the actual changes when and as they occur

Schedule control is one of the most difficult but important activities within project control. The project schedule can be affected by any number of issues from resources to funding, vendors, weather, and anything in between. The ability of a project manager to manage the schedule of a project and deliver it on time is a high-visibility concern for project success from a customer point of view.

Change Control Systems

Schedule issues, as stated previously, come from a variety of sources. But there should be a single, focused method for dealing with schedule changes. If a potential schedule problem is discovered, the problem must be investigated and the cause uncovered as soon as possible. Once the problem is discovered, a plan should be created for correcting the problem in the shortest allowable time with the least impact. It is also advisable to bring forward alternatives of varying costs.

Schedule control is something that typically is managed at the project level by the project manager. However, it is very important to make the customer aware that a schedule change has occurred. Furthermore, the customer needs to be made aware of what is being done to fix the issue and the impact it will have on the project's performance and deliverable.

Inputs to Schedule Control

- The project schedule
- Performance reports
- Change requests

The project schedule is developed in the Planning Phase. After development and review, it will be baselined and will document the planned schedule to complete the scope of work defined for the project. As project execution begins, the schedule will be updated to reflect actual progress and will be modified to reflect approved changes. It will provide the basis for measuring and reporting schedule performance.

Performance reports, created as part of the Execution Phase, will provide information on the project's performance, as measured against the Project Plan, indicating if activities were started and completed on the planned dates. With the scope of the quality work defined and verified in the quality control processes, performance reporting is simplified. When significant variances are identified, further analysis is performed to determine if there is a need for corrective action. Schedule performance reports may also be effective in alerting the project team to current or pending problems that may be mitigated by prompt corrective action.

Change requests may occur in many forms—oral or written, clear or subtle. They may also be driven by different factors internally or externally, by operation or regulatory requirements, or by technology limitations. Changes may require extending or shortening the schedule, or modifications to the network logic to more accurately reflect the Project Plan.

Tools and Techniques for Schedule Control

The project team should establish a schedule change control system that defines the procedures by which the project schedule may be changed. It should include the paperwork, tracking systems, and approval levels necessary for authorizing changes. It may also document standard schedule reports, milestones, and other project views to be used in the project management software, status update procedures, frequencies, and other major components of the project or product. Schedule control should be integrated with the overall change control system.

Change Control Systems

The project schedule is one of the more visible and well-known control mechanisms of project control. However, it has marginal (positive or negative) effect by itself. The schedule viewed in isolation is of limited value, especially if it is based on poor planning, unclear requirements, and limited quality control, or if cost control is not taken into account. For example, the schedule may show that the project is 50 percent complete, which is on target, but the project may have spent 65 percent of the total project budget. Agencies are cautioned to ensure that schedules are evaluated against a comprehensive plan and, where possible, measured against other metrics to ensure that they provide an accurate representation of project status.

Other important tools for supporting schedule control include the following:

- Performance measurement
- Additional planning
- Project management software

Performance measurement is used by agencies when they adopt techniques such as Earned Value Management (EVM) to help assess the magnitude of any variations that do occur. An important part of schedule control is to decide if the schedule variation requires corrective action. Performance measures provide some external ruler to assist management in making a decision on more than just a gut feeling about the significance. For example, a minor delay on a non-critical activity may have little effect on the overall project, while a much shorter delay on a near critical activity may require immediate action.

Additional planning includes prospective changes that may require new or revised estimates of activity duration, modified activity sequences, or analysis of alternative schedules.

The ability of project management software, such as Niku Workbench, to track planned dates versus actual dates and to forecast the effects of schedule changes, real or potential, makes them useful tools for schedule control.

Caution should be exercised with the dependence on project management software. While each program will assist in project management, it will *not manage the project* and may provide a false sense of security with regard to project health. The program is a powerful tool that, when used by a skilled project manager with good data and consistent updating, can greatly assist the project team. However, considering that no project management tool operates in an identical fashion, there should be a good understanding of how the tool handles information before it is used to manage a project of any size or complexity.

Outputs from Schedule Control

Schedule control will provide the project team and stakeholders with the following:

- Schedule updates and revisions
- Corrective action plans
- Lessons learned

Change Control Systems

Schedule updates are any modifications to schedule information that are used to manage the project. Updates will normally be provided on a regular basis. The frequency must be determined in conjunction with the reporting requirements. Appropriate stakeholders must be notified as needed. Schedule updates may or may not require adjustments to other aspects of the overall Project Plan.

A revision is a modification to the approved project schedule start and finish dates. If the revisions of the date(s) are severe enough, the schedule may need to be re-baselined in order to provide realistic data to measure performance.

Important Note **–** The difference between the baselined (planned) and actual start and finish dates is a *variance*, not a revision. Revisions occur when there is a material change in the basis of work that is scheduled to occur, making the previous baselined schedule no longer an accurate ruler to measure schedule progress.

Corrective actions are any actions taken in response to schedule variances in order to bring expected future schedule dates in line with the Project Plan dates (baseline). Corrective action for schedule variances may be in the form of applying additional resources, adjusting work schedules, compressing future activities, or other activities to ensure completion of an activity on time, or minimize the previous variance. Corrective actions may be made for positive and negative variances.

Lessons learned are simply defined as the cause of variances and the reasoning behind the corrective action chosen; other types of lessons learned from schedule control also should be documented. The documentation may then be used to develop a historical record for both this project and future projects. The lessons learned, if used, should improve the agency's ability to estimate, execute, and manage future projects.

Risk Control

Risk control involves executing the Risk Management Plan in order to respond to risk events over the course of the project. When changes occur, the basic cycle of: identify, qualify/quantify, and respond is repeated. It is important to understand that even the most thorough and comprehensive analysis cannot identify all risks and probabilities correctly; control and iteration are required.

Inputs to Risk Control

- Risk Management Plan - Developed in the Project Planning Phase.
- Actual risk events – Some of the identified risk events will occur; others will not occur. The ones that do are actual risk events or sources of risk, and the project management team must recognize that one has occurred so that the response developed can be implemented.
- Additional risk identification – As project performance is measured and reported, potential risk events or sources, if not previously identified, may surface.

Tools and Techniques for Risk Control

- Workarounds – Workarounds are unplanned responses to negative risk

Change Control Systems

events. Workarounds are unplanned only in the sense that the response was not defined in advance of the risk event occurring.

- Additional risk response development – If the risk event was not anticipated or the effect is greater than expected, the planned response may not be adequate, and it will be necessary to repeat the response development process and perhaps the risk quantification process as well.

<u>Outputs from Risk Control</u>

- Corrective action – Corrective action consists primarily of performing the planned risk response (e.g., implementing contingency plans or workarounds).
- Updates to Risk Management Plan – As anticipated risk events occur or fail to occur, and as actual risk events effects are evaluated, estimates of probabilities and value, as well as other aspects of the Risk Management Plan, should be updated.

Quality Control

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. Quality control should be performed throughout the project. Project results include both product results such as deliverables and management results such as cost and schedule performance. Quality control is often performed by a quality control unit, or a similarly titled organization unit, although this is not a requirement.

The project management team should have a working knowledge of statistical quality control, especially sampling and probability, to help evaluate quality control outputs. The team should also be aware of the following:

- Prevention (keeping errors out of the process) and inspection (keeping errors out of the hands of the customers)
- Attribute sampling (the result conforms or it does not) and variables sampling (the result is rated on a continuous scale that measures degrees of conformity)
- Special cases (unusual events) and random causes (normal process variation)

Tolerances (the result is acceptable if it falls within the range specified by the tolerance) and control limits (the process is in control if the result falls within the control limits).

<u>Inputs to Quality Control</u>

- Work Results include the process and product results. Information about the planned or expected results (from the Project Plan) should also be available along with information about the actual results.
- The Quality Management Plan must address quality control, quality assurance, and quality improvement.
- Operation definitions describe in very specific terms what something is and how it is measured by the quality process. Operational definitions are also called "metrics" in some application areas.

Change Control Systems

- Checklists.
- Inputs to other processes. The quality planning process may identify a need for further activity in another area.

Tools and Techniques for Quality Control

- Inspection includes activities such as measuring, examining, and testing undertaken to determine whether results conform to requirements. Inspections may also be called *reviews*, *product reviews*, *audits*, and *walk-throughs*; in some application areas these terms have narrow and specific meanings.
- Control charts
- Pareto diagrams
- Statistical sampling
- Flowcharting
- Trend analysis

Outputs from Quality Control

- Quality improvement
- Acceptance decisions
- Rework
- Completed checklists
- Process adjustments

Cost Control

Projects may fail to control cost, or go over budget, for many reasons. Often it is not a single problem but a series of small problems that, combined, permit cost control to be sacrificed and prevent the project from being completed successfully. Cost control contains the following attributes:

- Influencing the factors that create changes to the Project Budget Estimate to ensure that the changes are beneficial.
- Determining that the Project Budget Estimate has changed.
- Managing the actual changes when and as they occur.

Cost control includes the following:

- Monitoring cost performance to detect variances from the Project Plan.
- Ensuring that all appropriate changes are recorded accurately in the Project Budget Estimate.
- Preventing incorrect, inappropriate, or unauthorized changes from being included in the Project Budget Estimate.
- Informing appropriate stakeholders of authorized changes.

Cost control is not simply a reporting process. It includes the searching out of the “why” for both positive and negative variances between the scheduled and actual costs. It must be thoroughly integrated with the other control processes (scope change control, schedule control, quality control, and others). For example, inappropriate responses to cost variances can cause quality or schedule problems or produce an unacceptable level of risk later in the project.

Change Control Systems

Inputs to Cost Control

The primary inputs to cost control are the following:

- Project Budget Estimate
- Performance reports
- Change requests

Project Budget Estimate – A Project Budget Estimate is a time-phased budget that is used to measure and monitor cost performance on the project. The Project Budget Estimate is developed as part of the Project Plan. To summarize, a work breakdown structure is initially developed to describe the products. It is subsequently decomposed into smaller elements and then used as a basis for a series of estimates for individual activity completion.

After all activities and their related costs are identified, the activities are linked into a logical order of completion and relationships are established (dependencies). The resulting network schedule produces a time-phased relationship of work to be completed. After summing the activity cost estimates in the same network time-phased relationship, the cost performance of the project can be established. When the schedule is baselined, the cost performance is called the "Project Budget Estimate". Project Budget Estimates are usually displayed graphically in the form of an S-curve, as illustrated below in Figure 5.3.

Many projects, typically larger ones, will have several cost curves. Some typical curves on projects may include cost, revenue, or cash flow to monitor different aspects of the project performance and plans.

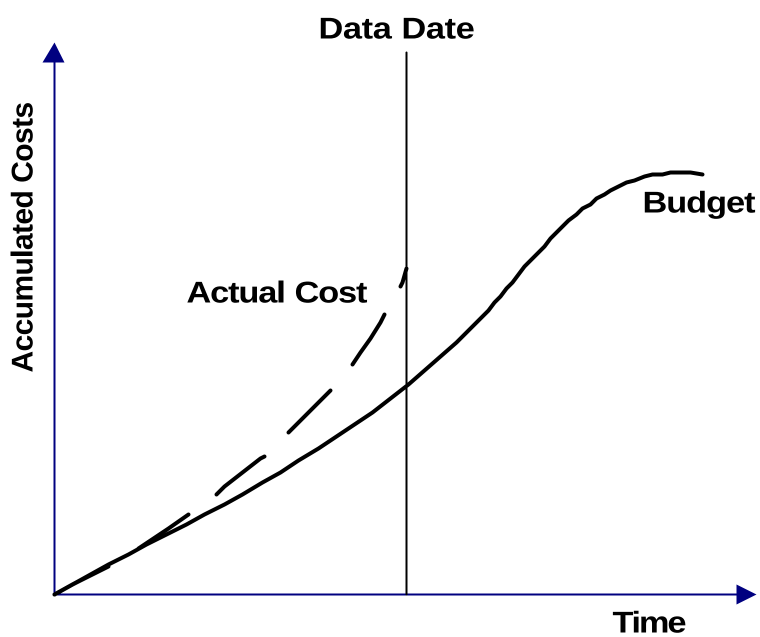

Figure 5.3
S-Curve Illustration

Change Control Systems

Performance reports – Performance reports provide information on the actual versus planned cost, indicating those items that did not perform as planned. They may also help identify trends, or possible future problems, to the projects. The reports also will be used to provide metrics and information to forecast future work on the project, and related similar work to allow improved estimates of similar work.

Change requests – Change requests may occur in many forms—oral or written, clear or subtle, internally or externally driven, operation or regulatory requirements, or driven by technology limitations. The problem, as stated earlier, is not change but unmanaged change. Change requests normally will be submitted and approved at varying levels in the organization, depending on the size or impact. However, a key facet to change requests is their central management, which is one entity of the project team that is a clearinghouse for all changes—submitted, pending, and approved. The entity must also have a defined process for communicating approved changes to all team members in a timely fashion to lessen impact.

Tools and Techniques for Cost Control

Cost change control systems define the procedures and processes by which the Project Budget Estimate may be changed. They include the paperwork, approval levels, and related items to document changes. The cost control system should be tightly integrated with the other change control systems. The following are some of the tools and techniques:

- **Performance measurement** – Performance measurement helps to assess the magnitude of any variations that occur. One of the primary objectives of cost control is to determine any variances that are driving change and then decide if the variance needs corrective activities applied. Applied corrective actions are based upon information obtained from established performance measures.
- **Additional planning** – Understanding that no project is normally executed according to the original plan, additional planning is used to re-estimate project costs or to study alternative approaches in executing the Project Plan.
- **Computerized tools** – Computerized tools can be used for the collection and collation of actual cost information and to develop useful information on the project's cost performance. Many of the software tools are already equipped with ready-to-use spreadsheet information formats.

To be effective, all tools require the reporting of actual performance on a consistent and regular basis for evaluation against project budget estimates. To prevent significant labor overhead for the maintenance of cost information during a project, the source and methods of reporting costs must be addressed in the initial phases of project planning and may be addressed in the Project Budget Estimate.

Outputs from Cost Control

The major outputs from Cost Control follow:

- Revised cost estimates
- Budget updates

Change Control Systems

- Corrective action
- Estimate at completion (EAC)
- Lessons Learned

Revised cost estimates are modifications to the cost information used to manage the project. They may be done in response to changes, additional information received from other activities, or other reasons. Stakeholders should be kept apprised of significant changes, either through normal reporting systems or exception reporting as outlined in the Project Budget Estimate. These modifications may or may not affect other aspects of the Project Plan.

Budget updates are a special category of revised cost estimates. They are changes to an approved Project Budget Estimate and are normally done in response to a change in project scope. They are synonymous with schedule revisions as outlined in the previous section. Budget updates may also be required if cost variances become so severe that the current plan no longer provides a realistic perspective on project performance.

Corrective action is anything done to bring expected future performance in line with the Project Plan.

EAC is a forecast of total project costs based on project performance. Developing this estimate goes deeper than the level of information provided in this methodology. More can be learned about EAC by researching Earned Value Management (EVM) and its applications in project management. If used correctly, EAC may provide management with insightful perspectives on project status, health, and forecasting information.

Lessons learned is the process of gathering and recording informational experience from other projects or best practices and then applying them to current and future projects so as to be more effective. Many of the lessons learned may come in the form of policies, guidelines, procedures, and techniques.

Contract Administration Control

Quite simply, contract administration control is the process of ensuring that the vendor's performance meets contractual requirements. This is accomplished through the use, and monitoring, of a Project Plan from the vendor, periodic progress reports, and the completion of deliverables as delineated in a project statement of work.

Change Control Process

Change Control Process

To have the process work requires that an individual submit information on the change to be considered. Project team members, customers, stakeholders, or contractors can submit a change request. This is to be done in writing, either on paper or in automated format.

The following Change Control Request template can be used. A project team can also design its own template and add or change the information as requested.

The template shown here is additive. In other words, additional information is completed on the template as it moves through the process. This process is also iterative, in that it will keep occurring until the project is complete.

Phase 1 – Requester Information

The template includes the following:

Identification Block – Is completed by the requester and identifies the change request title, which will be used in subsequent communication; the date submitted; and the person and organization submitting the request.

Proposed Change Description and References **–** Describes the change being proposed and clearly identifies whether the change is product-related, organizational, or procedural in nature. Any reference material that will assist the reviewers should be identified and attached.

Justification – A discussion of why the change is being proposed, including a cost benefit analysis. In other words, how will the customer and State agency benefit from the change?

Impact Statement **–** If the change is not implemented, how will it adversely affect the customer and State agency?

Alternatives **–** List at least one alternative (more if possible) to the change you are proposing, and indicate why the proposed change is better. Briefly indicate why the alternative is not the better choice.

Attach any supporting documentation that helps to clarify the proposed change.

When complete, submit the change request to the project change manager (or project manager if a project change manager has not been designated). At that time, a control number will be assigned so that the change request can be tracked to completion.

Phase 2 – Initial Review of the Change Request

All change requests will be reviewed on a regular basis by the project Change Control Board. This board will typically meet on a weekly, biweekly, or monthly basis. The actual schedule will depend on where the project team is in terms of the project life cycle. During phases that typically have a high volume of change, the board might meet weekly. During other phases, the board might meet only once a month. The change manager will drive the schedule based on the number and complexity of change requests.

As part of Phase 2 of the change control process, the board will complete the second part of the template, which includes the following:

Change Control Process

Initial review results and disposition – The Change Control Board will review the initial request and determine whether to proceed, reject, or defer the request. In moving forward, the request will be assigned to an analyst for an initial impact analysis.

Phase 3– Initial Impact Analysis

The assigned analyst will make an initial assessment of the cost, schedule, and resources needed to implement the proposed change. If the requested change is complex, a Cost/Schedule Impact Analysis (CSIA) should be requested.

The analyst will indicate this and will estimate the cost, schedule, and resources needed to perform the CSIA.

The Change Control Board will once again review the requested change and either accept, reject, or defer.

Phase 4 – Final Review Results and Change Priority

When the analysis has been completed by the assigned analyst and the cost, schedule, and resource needs are identified, the management team will submit the change to executive management and/or project oversight entities for review.

The appropriate processes will, with executive management and/or project oversight state agency approval, be followed to update contracts and the baseline documents.

Change Control Request Template

The Change Control Request Template can be found on the following page, as well as in Appendix B.

Change Control Request Template

State of Michigan
(Insert Agency Name Here)
Change Control Request

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:		***Date:***	
Controlling Agency:		***Modification Date:***	
Prepared by:		***Control Number: (From Control Log)***	

B. Requestor Information

Proposed Change Description and References:
The requestor will provide information concerning the requested change along with any supporting documentation.

Justification:

Impact of Not Implementing Proposed Change:

Alternatives:

C. Initial Review Results of the Change Request

Initial Review Date: **Assigned to:**

☐ **Approve for Impact Analysis**

☐ **Reject**

Change Control Request Template

☐ **Defer Until:**

Reason:

D. Initial Impact Analysis

Baselines Affected:

Configuration Items Affected:

Cost / Schedule Impact Analysis Required? **Yes** ☐ **No** ☐

Impact on Cost:

Impact on Schedule:

Impact on Resources:

Final Review Results:

Review Date:

Classification: ☐ **HIGH** ☐ **MEDIUM** ☐ **LOW**

E. Impact Analysis Results

Specific Requirements Definition:

Additional Resource Requirements	Work Days	Cost
TOTAL		

Impact of Not Implementing the Change:

Change Control Request Template

Alternatives to the Proposed Change:

Final Recommendation:

F. Signatures

Reviewing Body:

Name/Title	Signature	Date

Issues Management Process

The Issues Management Process

The purpose of the issues management process is to provide a mechanism for organizing, maintaining, and tracking the resolution of issues that cannot be resolved at the individual level. The approach consists of issue control mechanisms and a well-defined process that enables the project team to identify, address, and prioritize problems and issues.

The Issue Resolution Template gives everyone involved with, or affected by, the project a way to report issues or problems. It provides a template for documenting the problem, assessing the impact of the problem, making recommendations, and determining the cost (people and assets) and time required for resolving the problem.

The following Issue Document Template can be used by any agency. A project team may also modify this template as is needed to fit agency requirements.

This process is also iterative in that it will keep occurring until the project is complete.

Phase 1 – General Information

Issue Resolution Procedure—To have the process work requires individuals to submit information on the issues to be considered. Any of the project team members, customers, stakeholders, or contractors can submit an issue. This must be done in writing, either on paper or in automated format.

The Issue Document Template is divided into four sections. The first section is completed by the person reporting the problem. It identifies the change request title, which will be used in subsequent communication, the date submitted, and the person and organization submitting the request.

The remaining sections include the following:

- Description
- Recommendation
- Impact statement
- Date required and proposed assignee

Each element should be self-explanatory, but individuals should be directed to the project/issue manager for assistance as needed. Attach any supporting documentation that helps clarify the problem, such as report outputs, customer concerns, steps performed leading to the problem, error messages, and other pertinent data. When complete, submit to the project/issue manager. At that time, a control number will be assigned so that the issue can be tracked to completion.

Phase 2 – Issue Background

All issues will be reviewed on a regular basis at the project status meetings. This group will typically meet on a weekly or biweekly basis.

As part of Phase 2 of the issue resolution process, the group will complete the third and fourth parts of the form, which include the following:

- Reviewer information and initial comments
- Estimate of additional effort (CSIA prepared if further evaluation

Issues Management Process

required)

- Recommendation and, if approved, responsible person and planned completion date
- Project manager signature

Phase 3 – Recommendation

All action items will be tracked until they are resolved. The project/issue manager will report on all open issues at a weekly status meeting. If the list of issues is too long, only the new issues will be discussed.

At times, it may be advisable to pre-distribute issue information so that the project team can review the material before the meeting. This meeting will be the forum for making a determination regarding the outcome of the issue.

Phase 4 – Approval

When the issue or problem has been resolved and verified, the actual date the problem was resolved and an approval signature complete the issue resolution process, and the issue is closed.

Some issues may need executive management approval. The appropriate processes will be followed to update contracts and baseline documents.

Issue Document Template

State of Michigan
(Insert Agency Name Here)
Issue Document

A. General Information

Information to be provided in this section gives a specific name to the project as well as pertinent information about the personnel involved.

Project Name:	____________________	***Date:***	____________________
Controlling Agency:	____________________	***Modification Date:***	____________________
Prepared by:	____________________	***Issue Number: (From Issue Log):***	____________________

B. Issue Background

Issue Type (check one):

☐ **Request for Information**	☐ **System Problem**
☐ **Procedural Problem**	☐ **Other**
(Specify)	

Date Resolution Needed:	
Proposed Assignee:	
Attachments (if any):	☐ **YES** ☐ **NO**
Reviewer:	
Reviewer Completion Date:	
Reviewer Comments:	

Issue Description:

Initial Recommendation:

Potential Impact (if not resolved):

Cost / Schedule Impact Analysis Required? ☐ **Yes** ☐ **No**

Issue Document Template

Estimate of Additional Effort:

Resources Required	Work Days/Costs

C. Recommendation

Final Recommendation and Comments:

Name/Title	Signature	Date
(Project Manager)		

D. Management Action

Recommendation status (check one):

☐ **Accept** ☐ **Defer** ☐ **Need Additional Information** ☐ **Reject**

Assigned to: **Organization:**

Planned Completion Date:

E. Signatures

The signatures of the people below relay an understanding in the purpose and content of this document by those signing it.

Name/Title	Signature	Date

Information Technology Components for Project Control

Information Technology Project Control

Project control is understandably a universal effort for all projects. In IT projects, control is vital for keeping projects within scope, cost, schedule and within acceptable quality because there are so many variables that may come into play. As has been mentioned several times before, IT projects often deal with unknown or unproven technologies that make these projects difficult for the project manager to baseline the scope, schedules, and costs during the Planning Phase.

Project control in information technology is a combination of formal and informal processes that work together to keep a project moving forward while evaluating changes, redefining planning efforts, and making decisions that could effect the outcome of the project as a whole. The table below compares some of the simultaneous efforts of the SDLC and project management process during the Project Control Phase.

	System Development Life Cycle	**Project Management Control Phase Efforts**
Control Phase	• Develop • Test • Implement	• Scope Control • Schedule Control • Cost Control • Quality Control • Risk Control • Contract Administration • Change Control

Information Technology Scope Control

Scope control is extremely important within IT projects. It is not uncommon when team members are doing their development testing or implementation work for them to try to get creative or give the customer something other than, or in addition to, the original stated requirements. Doing any work that is outside or beyond the stated work, as called out in the original requirements, is considered “scope creep” or "expansion of scope". Expansion of scope is much more subtle within IT projects because adding additional features (e.g., adding an extra icon or function to an application) does not appear to be as significant as adding something to a normal project (e.g., adding an extra mile of road to a highway construction project).

In both cases, the additional scope of work has a tremendous impact on other control mechanisms within the project. The scope creep (unnoticed additions or changes to the project from the agreed upon requirements or specifications that increase the scope of the project) was most likely not budgeted or scheduled, which means that any small scope change could have large cost and schedule effect.

Information on scope planning was presented within the Project Planning section (see Objectives and Scope) of this methodology, and scope control was discussed in greater detail earlier in this Project Control section (see Change Control Systems).

Information Technology Schedule Control

In addition, schedule control is an important aspect of project management that is often overlooked during information technology projects. Information technology projects may have several different dependencies or factors that

Information Technology Components for Project Control

can influence product delivery dates and, ultimately, customer satisfaction. These factors and dependencies may include, but may not be limited to, the following:

- Availability of staff or resources
- Delivery of equipment or software
- Unexpected events
- Deliverables from other projects or personnel

Because customers sometimes see meeting the schedule as the most important part of a project, it is a good idea for project managers to hold regular project schedule reviews. Large or complex IT projects may have several schedules being managed at a deliverable or functional level. Therefore, having the "owners" of these schedules meeting at regular intervals is of great benefit to the project manager. The project manager is responsible for integrating these project schedules and making them understandable for all of the project stakeholders. Keep in mind that it is normally the scheduling function that defines when the SDLC should move from one phase to another (e.g., development is to be completed on 3/31 so that testing may begin on 4/1). Therefore, the relationship of the project schedule to the capabilities of the SDLC needs to be understood well ahead of time to develop an adequate but flexible project schedule.

For further information on schedule control review the Schedule Control subsection earlier in this section of the methodology.

Information Technology Cost Control

Cost control is a process highly valued by IT project stakeholders. This is also an area where the unpredictability of technology can wreak havoc on the plans laid out within a project. As discussed in the Project Budget Estimate subsection of this methodology, the cost of projects and their resources is changing at an alarming rate. A project manager must be able to monitor the actual budgets of labor and resources against the baselines as laid out in the Project Budget Estimate. This is especially true of new technology areas in which the cost of labor or resources is especially high. Furthermore, the length and complexity of a project will have a direct impact on its potential to go over budget.

Setting budget limits and monitoring variances on budgets must be done early and often. Budget problems tend to compound themselves if left unattended. On an IT project, more money could be spent trying to fix budget, scope, or schedule issues near the end of a project than should have been spent on the entire project.

The Cost Control subsection of this methodology goes into sufficient detail to assist project managers in helping to set up the processes and procedures to ensure adequate project budget control.

Information Technology Quality Control

Unfortunately, whenever any of the other control mechanisms (e.g., schedule or cost) get off their baseline, it is normally the quality control of an IT project that suffers. As you have read, IT projects require a lot of attention to schedule and cost. Likewise, instituting quality control within a project is a very important variable. Setting up quality control audits and management

Information Technology Components for Project Control

processes that are carried out continually during the development and testing phases of the SDLC is absolutely critical for delivering acceptable IT projects.

Quality is a valuable commodity in all projects, but even more so with IT projects. Today's customers have high expectations for the availability and reliability of the systems they use. Expectations for dynamic, high-quality systems have become commonplace. Given the competitive nature of the IT environment and the ability to outsource to proven technology companies, it is essential for agencies to provide quality products to their customers by using a demanding quality program.

Extensive information is available on quality planning and control within the Quality Planning and Change Control subsections of this methodology.

Information Technology Risk Control

It is no secret that risk is an area that sets IT projects apart from other projects. While all projects involve some degree of risk, it is the use and expense of new or unknown technologies that provide the greatest risk to the project manager. Dealing with the issues through techniques such as risk avoidance or mitigation may even compound itself in other areas, such as cost and schedule.

Creation and constant updating of risk worksheets and plans are the keys to controlling risk throughout a project. Having plans and procedures in place to control risk events when they occur is crucial to being able to deliver projects on time and within scope. There is no silver bullet for risk management on IT projects. Entire companies have devoted themselves to helping companies manage and deal with risk issues. In information technology, the project managers must devote themselves to identifying, planning for, and dealing with risk on a daily basis.

Additional information on risk planning can be found in the Risk Planning section and Change Control subsection of this methodology.

Information Technology Contract Administration

As discussed in the Procurement subsection of the Project Execution section, contract administration can also be an important factor in delivering projects on time. Information technology projects, more than any other type, often require outsourcing work to other companies, or agencies that have the needed skills available. Being able to manage contracts to keep cost and outsourcing at a minimum are important skills that a project manager can use.

It is quite possible that an agency could use three or more different contractors for doing its development, testing, and implementation on large contracts.

Furthermore, setting up procedures for contract control and contract change are vital to dealing with unexpected situations during project, development, testing, and implementation. Without procedures in place, contract issues could go unresolved or result in project delays that damage the reputation of the agency and the integrity of the project manager.

As has been stated previously, most contract issues are handled via a

Information Technology Components for Project Control

procurement or purchasing office within the agency. However, it is still a good idea for project managers to be able to effectively manage and control contractual issues within the technology environment. More information on Contract Control can be found in the Change Control Process subsection of this section.

Information Technology Configuration Management

Finding methods for dealing with, managing, and changing multiple requirements and specifications has been a part of information technology since its inception. Configuration management, which is discussed in much more detail in this section of the methodology, is the process for managing different variables that are a part of IT projects.

Management of the variables include, but may not necessarily be limited to, the following:

- Requirements
- Specifications
- Version control
- Technical modifications
- Contract modification
- Any other item that may change throughout the life of a project and can be tracked

Configuration is not just a document or a plan but a process. It is something that must become part of the culture of any agency that performs IT projects. Information technology projects, by nature, have many more traceable items than non-IT projects and must be enforced by the project manager. The maturity of control and management of these processes takes years, but it is critical, even in the most rudimentary form, to all projects. The need for the existence and application of a defined and useable process cannot be underestimated.

PROJECT MANAGEMENT METHODOLOGY

SECTION 6 -- CLOSEOUT PHASE

Section 6: Project Closeout

Table of Contents

Introduction

Overview

This subsection describes the intent and some of the key elements associated with project closeout.

Administrative Closure

This subsection describes the process of preparing closure documentation of the product or process as well as taking other administrative actions to ensure that the project and its assets are redistributed.

Financial Closure

This subsection discusses the process of completing and terminating the financial and budgetary aspects of the project. This includes both external and internal project closures.

Financial Audit

This subsection describes the purpose and requirements of conducting a financial audit. This discussion also includes a brief explanation of who should perform the audit and briefly describes the sections of the audit report.

Celebration of Success

This subsection describes the importance of recognizing the completion of the project. Key questions are also presented as a method to determining project success.

Information Technology Components for Project Closeout

This subsection describes the importance of determining actions necessary to close out various aspects of information technology projects.

Section 6: Project Closeout

Overview

Project Closeout Phase

The last major phase of a project's life cycle is project closeout. Project closeout is performed once all defined project objectives have been met and the customer has accepted the project's product. Closing a project is a fairly routine process.

Project closeout includes the following key elements:

- Redistributing resources – staff, facilities, equipment, and automated systems
- Closing out any financial issues such as labor charge codes and contract closure
- Completing, collecting, and archiving project records
- Documenting the successes and issues of the project
- Conducting a lessons learned session
- Celebrating project success

These activities are particularly important on large projects with extensive records and resources.

Not discussed as part of this section are particular information technology processes dealing with transitioning the technical support into maintenance and operation. These tasks are diverse and unique to the specific environment of the project.

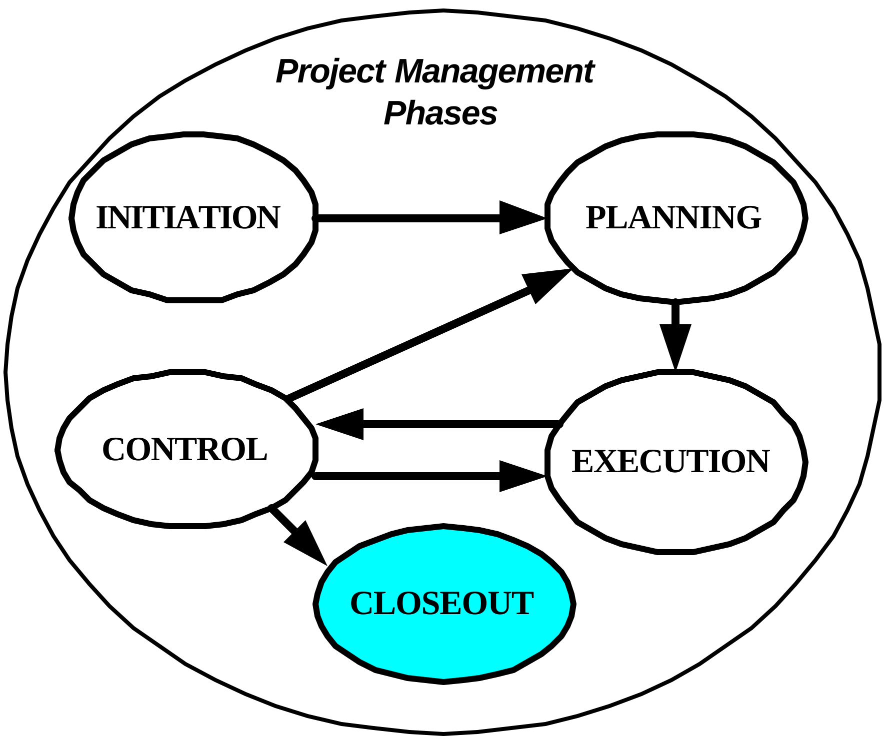

Figure 6.1
Project Management Closeout Phase

Administrative Closure

Administrative Closure

Administrative closure is the process of preparing closure documentation of the product or process deliverable to the customer as well as taking other administrative actions to ensure that the project and its assets are redistributed. Delivering closure documentation does not simply mean getting an approval or acceptance signature on the deliverable but involves a series of steps to ensure that the product meets the customer's expectations and conforms to the product requirements and specifications that were laid out.

One of the items that is produced from this process is called the "Post Implementation Evaluation Report" or PIER. Other areas included in administrative closure are archiving, facilities, and personnel reassignment. Closeout processes are depicted in Figure 6.2.

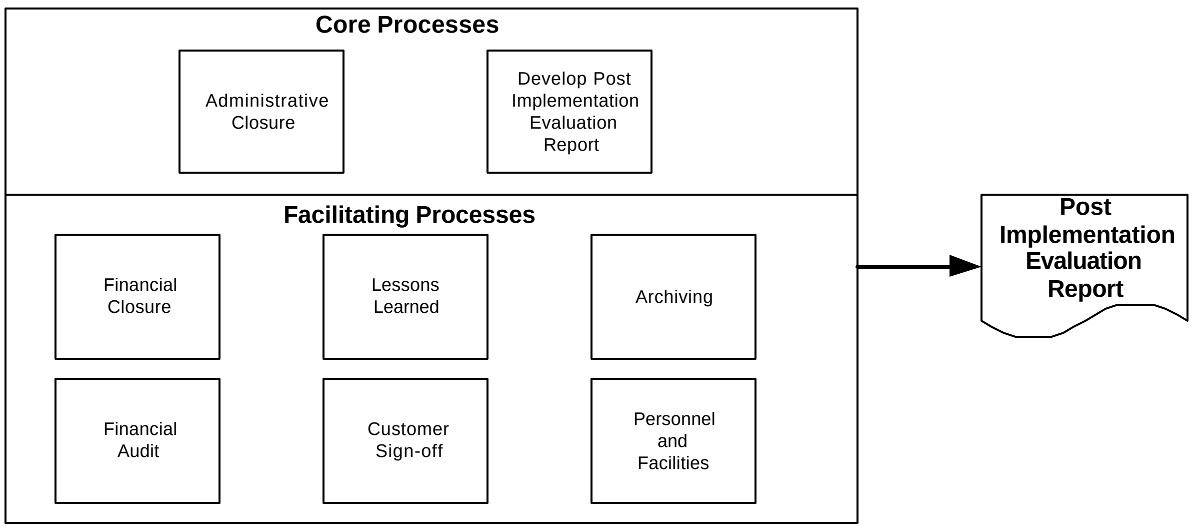

Figure 6.2
Relationships Among Closeout Processes

The fact that project closure appears at the end of the project does not mean that all project closure activities need to be delayed until then. As project phases come to an end it is important to conduct milestone reviews to ensure that phase activities have been successfully completed to the satisfaction of all involved. This relieves the project manager and project team of potentially having to deal with old and obscure open action items and outdated information.

Post Implementation Evaluation Report (PIER)

A Post Implementation Evaluation Report (PIER) documents the successes and failures of the project. It provides a historical record of the planned and actual budget and schedule. Other selected metrics on the project can also be collected, based on documented procedures. The report also contains recommendations for future projects of similar size and scope. Information within the PIER should include, but not be limited to, the following:

- Project sign-off
- Staffing and skills

- Project organizational structure
- Schedule management
- Cost management
- Risk management
- Quality management
- Configuration management
- Customer expectations management
- Lessons learned

A sample format of the PIER is available at the end of this subsection and in Appendix B.

Lessons Learned

Defining Lessons Learned

In addition to communicating the closure of a project in writing, it is also advisable to have a mechanism for group review. A "lessons learned" session is a valuable closure and release mechanism for team members, regardless of the project's success. Some typical questions to answer in such a session include the following:

- Did the delivered product meet the specified requirements and goals of the project?
- Was the customer satisfied with the end product?
- Were cost budgets met?
- Was the schedule met?
- Were risks identified and mitigated?
- Did the project management methodology work?
- What could be done to improve the process?

The lessons learned session is typically a large meeting that includes the following:

- Project team
- Stakeholder representation—including external project oversight
- Executive management
- Maintenance and operation staff

Such a session provides official closure to a project. It also provides a forum for public praise and recognition and offers an opportunity to discuss ways to improve future processes and procedures.

Documenting Lessons Learned

One purpose of the PIER is to document lessons learned. This means that problems encountered by the project team are openly presented. Problem identification on completed projects provides a method to discuss project issues encountered in hopes of eliminating their occurrence in future endeavors. It is important, however, that the problem discussions do not merely point a finger at some target other than the project team; responsibility and ownership for problem areas are critical to developing useful recommendations for future processes.

Administrative Closure

The individual problems that occurred throughout the course of the project should have been presented and documented when they occurred, then addressed and handled. The lessons learned documented in Project Closeout is more for upper management's review and action, as well as future project manager/team review, to prevent the same thing (bad) from happening again, or to make the same thing (good) happen again.

Problems encountered should be prioritized with focus on the top five to ten problems. It is not necessary to document every small event. However, all legitimate problems and issues should be discussed as requested by customers or management.

Because problems or sensitive issues may be discussed in the PIER document, it is helpful to have all organizations identified as contributors included in a review of the material prior to formally submitting the document. It is useful to have the reviews in an interactive forum where all parties can discuss their recommendations for improvement. The PIER can then present a complete view of the system.

<u>Identifying and Addressing Success</u>

Be certain that successes as well as problems on the project are identified in the PIER. It is important to include new ideas that were successful in the project. Make recommendations on how these processes might be adapted for other projects.

Share project successes with other organizations, both in the agency and with other state agencies. In the same way that problem identification can lead to improvements, successes must be shared so they can be repeated. Where possible, successes should be translated into procedures that can be followed by future projects.

<u>Preparing the Report</u>

The project manager typically has responsibility for preparing the report. The project manager gets input from the entire project team, the customers, and other major stakeholders. People performing different functions on the project will have a different outlook on the successes and failures and on possible solutions. If every project member cannot be consulted, at least ensure that a representative from each major area of the project participates. The customers' overall view of the project and its final product is also a major focus of the project. It is this view, along with the view of the major stakeholders, that lives on after closure has been completed.

Other Important Administrative Documentation

There are other pieces of documentation, and processes that go along with them that need to be brought to closure as the project winds down. The following section describes these documents and processes.

<u>Customer Project Sign-off</u>

As stated earlier, the issue of primary importance with project closure is the acceptance of the product or project deliverable(s) by the customer for which they were created. The best way to resolve this is to convene a final meeting with all necessary stakeholders to review the product delivered against the

Administrative Closure

baseline requirements and specifications. By this time any deviations from the established baseline will have been documented and approved, but it is still good policy to make all aware of the baseline deviations and justifications. Furthermore, any open action items or program level issues can be officially closed. By drawing all of the stakeholders together in a single meeting, the project manager avoids clearing up open issues on an individual basis.

The final deliverable of this meeting should be a statement created by the project manager describing the project's final deliverables in comparison with the authorized project baseline documents. Approval is verified via the signature of a project closure document by all of the stakeholders who signed the original project baseline documentation (e.g., the Project Plan). This document will be customized to the particular project to include pertinent deliverables, key features, and important information about final product delivery.

Product Documentation

All documentation that has anything to do with the product itself (including design documents, schematics, technical manuals) that have not already been turned over to the operations and maintenance organizations must be completed and turned over to the project manager.

Archiving

Collecting Project Archive Data

Following preparation of the PIER, the project information is archived. Historic project data is an important source of information to help improve future projects.

The specific information that is archived for a project will vary between state agencies. Typically, the following project data is archived:

- Project Notebook
- Project Plan, including the Project Charter, Project Scope Statement, Risk Management Plan, etc.
- Correspondence
- Meeting notes
- Status reports
- Contract file
- Technical documents
- Files, program, tools, etc., placed under configuration management
- Other Information

All hard copy records should be stored following standard State of Michigan record retention guidelines. Many of the technical records and automated versions will be turned over to State personnel responsible for maintenance and operation of the system. Summary technical information should be electronically stored for historical reference to facilitate later review. The project archive includes a description of the files being submitted, the application (including version) used to create the archived materials, and a point of contact if further information is needed.

Administrative Closure

The summary project management information includes information such as a description of the project, a project organization chart, budgeted and actual cost, and budgeted and actual schedule. Assumptions associated with the project budget values and budget changes documented throughout the project are included in the archive.

Maintaining the Archive

Agency project information is archived by the responsible record keeping system within the agency and can be reviewed as needed.

Using the Archives

Building a repository of past projects serves as both a reference source for estimating future efforts and a training tool for State project manager.

Project archives can be used when estimating projects and in developing metrics on productivity of the project teams. Use of past performance metrics for estimating future work provides the best source for future estimates. When sufficient project data is collected over time, the state may develop an experience database to make strong estimates and develop realistic Project Plans.

Personnel and Facilities

Another administrative closure process is the reassignment and reallocation of agency personnel and equipment that have been used during the project.

Personnel

If personnel have been applied against the project full-time, when the project comes to an end it is important to get the people back into the available resource pool as quickly as possible. This will ensure that the people stay busy and that other projects within the agency do not fall short of resources. This will also include closeout of the labor charge code (if necessary) used for the project. This is explained in greater detail in the Financial Closure subsection.

Facilities

If the project team has occupied agency facilities for a long period of time during the project, it is a good idea to let the controlling facilities personnel know that the space used for the project will become available again. This, of course, is only true if there is a place for the team members occupying the space to go.

Note: Be sure to check facilities guidance documentation to determine whether changes made to the project team area (structure, equipment, or technical modifications) are the responsibility of the project team after the project is complete. Returning the facility and equipment to its original state could add unanticipated cost and manpower to a project.

Post Implementation Evaluation Report (PIER) Template

The Post Implementation Evaluation Report (PIER) template can be found on the following page, as well as in Appendix B.

Post Implementation Evaluation Report Template

State of Michigan
(Insert Agency Name Here)
Post Implementation Evaluation Report

A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the project and project participants.

Project Name:	______________________	***Date:***	____________________
Controlling Agency:	______________________	***Modification Date:***	____________________
Prepared by:	______________________	***Authorized by:***	____________________

B. Staffing and Skills

Describe how the staffing and skill needs for this project were determined and managed. Describe the changes to these needs during the project.

C. Project Organizational Structure

Provide an organization chart that was used for the project. Describe any changes made to the structure along the way and why they were made.

D. Schedule Maintenance

Provide the baseline project schedules and final project schedules (add attachments if necessary). Describe the process used for controlling schedules as well as actions taken to correct any problems.

Project Schedule General Discussion

Schedule Control

Schedule Corrective Actions

Post Implementation Evaluation Report Template

Schedule Integration

E. Cost Management

Describe cost and budget results of the project in comparison to the baseline.

Cost Budget Overview

Corrective Actions

F. Risk Management

Provide a description of the major risks identified for the project and how they were handled.

Risk Identification and Mitigation

Risk Impact

G. Quality Control

Describe how quality assurance was involved in this project.

H. Configuration Management

Describe how the configuration management process was utilized.

Post Implementation Evaluation Report Template

I. Communications Management

Describe the project communication process, its effectiveness and any changes made to the communications plan during the project.

J. Customer Expectations Management

Describe how customer expectations were managed. Were expectations clear from the beginning? How were expectations different than expected?

K. Lessons Learned

Describe the successes and shortcomings of the project.

L. Project Sign-Off

Delineates that the functional areas of the project team have taken all the steps to provide deliverables and that project activities are closed out.

Name/Title	*Signature*	*Date*

Financial Closure

Financial Closure

Financial closure is the process of completing and terminating the financial and budgetary aspects of the project being performed. Financial closure includes both (external) contract closure and (internal) project account closure. The following sections describe some of the actions that must be taken to ensure financial closeout.

Project Account Closure

Definition and Explanation

Project account closure is an internal process that formalizes the termination of a project for the staff within the agency. Without setting definitive dates and providing a formal process for closure, projects have a tendency to live past their scheduled completion date. For instance, if a termination date is not set for a project, it is possible that the project might continue indefinitely, allowing personnel to apply resources and labor against it. If this were to happen, a project would not be a project any longer, but could potentially turn into a program without a defined end date. Projects by definition have limited budgets and lifespans, so it is necessary to terminate them at some point.

Setting a Completion Date

Often projects have a completion date imposed upon them at their inception, which by nature makes that date the termination date for the project. The completion date for a project is the date that all project-related activities needed to produce the product should be completed. Beyond this date, there should be no need to apply labor or resources against the project because it will have delivered or turned over to operations. Any further work done on the product beyond this date should be considered an operations and maintenance cost.

Closing Account Charge Codes

Most projects have account numbers associated with them that allow the financial departments to track labor hours and resource procurement. These labor charge codes will need to be deactivated so that no personnel may continue to charge time against the project or use the project charge codes to purchase materials, etc. Closure of the charge accounts should be formalized via written request that the project manager turns over to the managing financial organization.

Spreading the Word

Agency staff and management need to be told as far ahead of time as possible when the project will be coming to completion. There are a few reasons for this.

- The staff applied to the project will know the date beyond which they will not be able to charge their time against and purchase resources for the project.
- Management will be able to plan where their resources will be applied next after the current project is complete.
- Setting a date provides a sense of urgency to resolve issues and complete activities that have been dragging on without resolution.

The termination date of the project should be included in the project schedule as well as any ongoing project documentation. Staff members

Financial Closure

should be reminded ahead of time that charge codes will become inactive on a certain date. This can be done via e-mail or whatever means is convenient to ensure that the word is passed.

Process for Contract Closure

Definition and Explanation

Contract closure is the process of terminating contracts that outside organizations or businesses have with the state agency as part of the project being performed. These contracts may be vehicles for providing technical support, consulting, or any number of services supplied during the project that the agency decided not to perform itself. Contracts can be brought to closure for variety of reasons, including contract completion, early termination, or failure to perform. Contract closure is a typical but important part of project management. It is a simple process, but close attention should be paid so that no room is left for liability of the agency.

Collect Documentation

In order to close a contract, it is important to collect all of the pertinent documentation for review. This will include all of the original contracts and supporting documentation such as schedules, contract changes, and performance reports. This documentation needs to be reviewed thoroughly to ensure that there are no unrealized contract issues that could open up legal liability.

Audit

Although audits are discussed in greater detail later in the audit subsection, suffice it to say that a thorough review of the procurement and contracting documents needs to take place. This covers the Planning Phase through the actual administration of the contract.

Contract Closure Documentation

In order to formally close a contract, the agency provides the contracted company or organization with a formal written notice stating the completion of the contract and reason for termination. Standard verbiage for acceptance and closure is usually found in the original contract itself.

It is also a good idea to keep a complete set of contractual records for the project in a safe and accessible place in case they need to be referenced at any point in the future.

Financial Audit

Financial Audit

A financial audit is the thorough examination of a project by an evaluation team and includes a detailed overview of the project's financial procedures, budgets, records, etc. It may deal with a project as a whole or separate parts of a project. An audit may take a few hours to several months depending on the size, visibility, and the detailed information available on the project. Although financial audits can occur anytime throughout the project, the emphasis of this section is on the Closeout Phase.

Purpose of an Audit

The project audit is intended to determine where, in measurable terms, the actual costs on the project may have overrun or underrun and determine the cause of the variation. It is also an investigation into the ethical and financial responsibility of the staff involved with the project. Because many state projects are funded through state taxes and appropriations, it is imperative that all of the project members be held accountable to the highest degree of fiscal responsibility.

Furthermore, the financial evaluation also provides an opportunity for project managers and agencies to learn where they can improve financially on the implementation of similar future projects.

Audit Information Requirements

Financial project audits require quite a bit of information to make accurate assessments. This information may include, but not be limited to the following:

- Budget plans (staff and resource baselines)
- Staff timesheets
- Contracts with external organizations
- Procurement guidelines
- Purchase orders
- Budget status reports
- Change control results

This information is evaluated by an audit team to determine if the time and resources spent on the project measurably reflect the product produced as a result of the effort.

The Financial Audit

The financial audit may be performed by teams either internal or external to the state agency. External teams may be selected because of their experience and impartiality. Internal teams may be selected as a result of the size of the project or the team members' knowledge of the financial guidelines of the agency. Internal teams, if used, may include members from the project team, the agency accounting department, executive management, human resources, contracts/procurement, and the legal department.

The audit team must have full accessibility to the project records and project staff to make an informed and unbiased assessment of the financial health of the project. Although accessibility to the staff may be difficult, and at times intrusive, it is important that the staff take the time to discuss the project with auditors. Care must be taken to avoid misunderstandings, and auditors must avoid comments that may be construed as critical. The auditors have a

Financial Audit

responsibility to be as fair as possible and occasionally may need to rely on their own interpretations of the data.

Project Audit Sections

A financial audit is a formal report that needs to be organized in an understandable and systematic format. It may be necessary for the audit team to develop a method for separating useful information pertinent to the project from irrelevant or distracting information.

If a financial audit is done internally, the time spent should be commensurate with the amount of time actually spent on the project. Some audits will be much more detailed than others. Financial audits may be presented in a variety of formats according to the project but should at a minimum contain the following sections:

Current Status

This section confirms the status of the project and details what has been accomplished and the amount of resources or labor that has been applied to achieve this status.

Baselined Standards

This section describes the agreed upon baseline or standard from which the project was to be managed on a daily, monthly, or annual basis.

Deviations

This section describes any significant changes or deviations of the actual costs from the baselined standards as well as the process used to approve those changes.

Explanation and Recommendations

This section provides explanations for any deviations and provides recommendations on how the situation should have been handled on this project and how it should be handled on future projects.

This section also provides recommendations on what areas should be monitored more closely in the future and any necessary staffing changes that need to be made. This is an important point because at the time of a post project audit, there is often very little that can be done to improve the financial health of the project.

Audience

Once completed, the financial audit should be delivered to the project's financial authority. This may be a single person or an agency functional unit (finance or accounting). Copies should also be made available to executive management and the project manager as necessary in order to verify any assumptions made by the audit team or clarify any unresolved issues.

Celebration of Success

Celebration of Success

Celebrate the success of completing a project!

There is fairly universal recognition that positive reinforcement, or rewarding behavior, is an effective management tool. Because it is a goal within the state to increase the number of successfully executed projects, it is important to recognize teams that have met this goal. When success in a project is achieved, be certain to provide some recognition to the team. If individuals are singled out for significant achievements, don't forget to recognize the entire team as well.

One step of the Closeout Phase is the customer's acceptance of the system. This is a critical and important step, as the customer decides when the project is completed. Acceptance is based upon the success criteria defined in the very early concept and planning stages of the project. This acceptance may be very informal or it may be very formal, depending on the defined criteria.

What is Success?

Success is defined at the early stages of planning the project. In this project management methodology, success factors are developed as part of the Initiation Phase. Success is not tied to only budget and schedule. Many projects can be considered a tremendous success even though the project ultimately cost more than had been anticipated.

Some key questions that determine success include the following:

- Were the success objectives achieved?
- Do the stakeholders and customers view, in a positive manner, the project product?
- Was the project well managed?
- Did the team work well together and know what was going right and wrong?

Informal Recognition

There are many ways to reward people for a job well done. The reward might be an informal after work gathering or a lunchtime pizza celebration.

Formal Recognition

State organization management may also want to express recognition of a successful team effort by praising the team at a key meeting or a large gathering of staff. Team members are proud to have executive management state appreciation, and such recognition sets the stage for future successful work.

Formal recognition can also be achieved through coordination with the agency for articles in industry periodicals and updating project data that is circulated to the legislature.

Other options include plaques or gift certificates, should management and budget allow for such expenditures.

Information Technology Components for Project Closeout

Information Technology Project Closeout

Project closeout is a fairly straightforward process. The intent of the actions in this phase is to bring closure to the activities that have been carrying on in the Execution and Control Phases. The process for information technology projects is basically the same as for non-Information Technology projects. The project manager is responsible for ensuring that the common closeout processes are carried out while the developed systems are rolled over into maintenance mode. The table below compares the Closeout Phase between the two different life cycles at a very high level.

	System Development Life Cycle Closeout	**Project Management Closeout Phase**
Closeout Phase	• Maintenance	• Administrative Closure • Financial Closure • Financial Audit

Information Technology Project Administrative Closure

Information technology project administrative closure is very similar to that of any other project. However, there are some additional considerations for information technology projects.

<u>Documents</u>

As described in the Administrative Closure section of the Closeout Phase, one of the necessary actions that needs to be performed is to collect all pertinent documented information on the project that was performed in order to create a repository for the archive. This is especially important in information technology projects because similar projects in the future can benefit a great deal from the information gathered and processes used to manage technology development. Technology changes at a blistering rate. It is incredibly helpful for project managers to be able to refer to similar projects and the methodologies used (both successful and unsuccessful) to assist them. Therefore, the Post Implementation Evaluation Report will be extremely helpful to other project managers who create and manage similar projects.

Similarly, information technology projects must be documented in much greater detail in order to maintain and operate the systems that have been developed. Turnover of the necessary documents to technicians and maintenance staff must be timely and complete. Although the maintenance manuals and similar documents are typically created by the technical development team, it is the project manager's responsibility to ensure that all materials needed to utilize the new product or process are available and complete.

<u>Facilities</u>

Information technology projects regularly require the use of facilities for development and testing or other activities. Occasionally, these activities will require that hardware, software, or even the physical facilities be altered in some way to accommodate the needs of the project. When this occurs, project manager must take responsibility for ensuring that the facilities and equipment used are returned to the owners in a predefined, acceptable

Information Technology Components for Project Closeout

condition. It is also important to have a plan for redistribution of software, hardware, or other equipment used in the development of the project if these items are not going to be used during implementation and maintenance.

Additional information on administrative project closeout is available in the Administrative Closure subsection of this methodology, and a template version of the Post Evaluation Implementation Report template can be found in Appendix B.

Information Technology Project Financial Closure

Information technology projects commonly involve contracting and subcontracting of technical work to be done by organizations outside of the agency. While these contracts have been monitored all along during the project, it is important to set expectations and guidelines that clearly explain when the agency considers the project to be complete. Formal contract closure with subcontractors may be handled by the finance or accounting area of the respective agency, but it is the project manager's responsibility to ensure that all contractual obligations have been met according to the deliverables and quality of work produced.

In addition, information technology projects have a tendency to use several resources from across many business areas within the organization and, in some cases, several locations. In these cases, the project team must be aware of when the project manager is bringing closure to the project labor and resource accounts that have been used. As mentioned in the Financial Closure subsection, this includes sending out e-mail or letters or using some other type of correspondence to spread the word.

Details of financial project closeout are presented under the Financial Closeout heading in the Closeout section.

Information Technology Project Audit

There is nothing significantly different with respect to a project audit on an information technology project. The one consideration that should be made as a project manager, however, is that technology projects tend to have more contractors and subcontractors than other types of projects. In preparation for an audit, it may be a bit more work to gather timesheet and financial information for project managers because of contracting issues. This should be kept in mind as the financial data collection process begins.

Information Technology Components for Project Closeout

PROJECT MANAGEMENT METHODOLOGY

APPENDICES

Table of Contents

Appendix A

Project Management Methodology Glossary

Key Terms and Acronyms

The following is a list of common terms and acronyms used within the project management industry. While many of these terms are not mentioned within the body of this guide, they are nonetheless important for understanding project management. If you need further information on any of the subjects in the following list, please consult the State of Michigan Project Management Methodology and the variety of sources listed in the Resource and Reference Lists in Appendices D and E of the Project Management Methodology. These terms are taken from several sources, including the California DOIT Project Management Methodology, the Project Management Body of Knowledge, and other referenced sources in Appendices D and E.

- A -

Acquisition Process – The process of acquiring personnel/goods/services for new or existing work within the general definitions of contracts requiring an offer and acceptance, consideration, lawful subject matter, and competent parties.

Action Item Status – A list of problem issues, including a description, point of contact, and dates of action and resolution.

Action Plan – A plan that describes what needs to be done and when it needs to be completed. Project plans are action plans.

Activity – The work or effort needed to achieve a result. An activity consumes time and usually consumes resources.

Activity Definition – Identifying the specific activities which must be performed in order to produce the various project deliverables.

Activity Duration Estimating – Estimating the number of work periods which will be needed to complete individual activities.

Actual Cost – Total costs incurred (direct and indirect) in accomplishing work during a given time period.

Administrative Closure – Generating, gathering, and disseminating information to formalize project completion.

Agency – Used to define a general state organizational level consisting of the Agency and Departments interchangeably. Reference to Agency (with a capital "A") is used for reference to a specific Agency or to that specific organizational level.

Alternative Analysis – Breaking down a complex scope situation for the purpose of generating and evaluating different solutions and approaches.

Analysis – The study and examination of something complex and the separation into its more simple components. Analysis typically includes discovering not only what are the parts of the item being studied, but also how they fit together. An example is the study of schedule variances for cause, impact, corrective action, and results.

Application Area – A category of projects that have a common element not present in all projects. Application areas are usually defined in terms of either the product of the project (i.e., by similar technologies or industry sectors) or the type of customer (e.g., internal vs. external, government vs. commercial). Application areas often overlap.

Appendix A

Project Management Methodology Glossary

Approve – To accept as satisfactory. Approval implies that the item approved has the endorsement of the approving entity. The approval may still require confirmation by somebody else, as in levels of approval. In management use, the important distinction is between approve and authorize. See Authorization.

Areas of Responsibility – Used to define the person or organizational entity responsible for specific policy areas, processes, and procedures as identified. The current levels of responsibility are Legislature, Department of Management and Budget, state agency, and customer.

Arrow Diagramming Method (ADM) – A network diagramming technique in which activities are represented by arrows. The tail of the arrow represents the start and the head represents the finish of the activity (the length of the arrow does *not* represent the expected duration of the activity). Activities are connected at points called "nodes" (usually drawn as small circles) to illustrate the sequence in which the activities are expected to be performed.

Authorization – The power granted by management to specified individuals allowing them to approve transactions, procedures, or total systems. Defined as the final organization authority.

Authorized Work – An effort that has been approved by higher authority and may or may not be defined.

- B -

Backward Pass – The calculation of late finish dates and late start dates for the uncompleted portions of all network activities. Determined by working backwards through the network logic from the project's end date.

Baseline – The original plan (for a project, a work package, or an activity) plus or minus approved changes. Usually used with a modifier (e.g., cost baseline, schedule baseline performance measurement baseline).

Budget – When unqualified, refers to an estimate of funds planned to cover a project or specified period of future time.

Budget At Completion (BAC) – The estimated total cost of the project when done.

Planned Value – The sum of the approved cost estimates including any overhead allocation) for activities (or portions of activities) scheduled to be performed during a given period (usually project-to-date).

Business Impact Analysis – Identifies project constraints, alternatives, and related assumptions as they apply to the initiation phase.

Business Plan – Model used by a manager for planning and scheduling project work.

- C -

Calendar Unit – The smallest unit of the calendar produced. This unit is generally in hours, days, or weeks. It can also be grouped in shifts.

Champion – A person who takes on personal responsibility for the successful completion of a "visionary project."

Change Control – The process of controlling, documenting, and storing the changes to control items. This includes proposing the change, evaluating, approving or rejecting, scheduling and tracking.

Change Control Board (CCB) – A formally constituted group of stakeholders responsible for approving or rejecting changes to the project *baselines.*

Appendix A

Project Management Methodology Glossary

Change in Scope – A change in objectives, work plan, or schedule resulting in a material difference from the terms of previously granted approval to proceed.

Change Management Process – A set of tasks or procedures established to ensure that project performance is measured to the baseline and changes are reviewed, approved or rejected, and the baseline is updated.

Chart of Accounts – Any numbering system used to monitor project costs by category (e.g., labor, supplies, materials). The project chart of accounts is usually based upon corporate chart of accounts of the primary performing organization.

Code of Accounts – Any numbering system used to uniquely identify each element of the *work breakdown structure*.

Concept – An imaginative arrangement of a set of ideas.

Conceptual Project Planning – The process of developing broad-scope project documentation from which the technical requirements, estimates, schedules, control procedures, and effective project management will all flow.

Concurrent Engineering – An approach to project staffing that, in its most general form, calls for implementers to be involved in the design phase. Sometimes confused with *fast tracking*.

Configuration Control – The process of evaluating, approving or disapproving, and managing changes to controlled items.

Configuration Management (CM) – The technical and administrative application of configuration control. It includes the maintenance of a configuration control unit, change and version control standards, and configuration of control facilities. Configuration Management is a formal discipline which provides project team members and customers with the methods and tools used to identify the product developed, establish baselines, control changes to these baselines, record and track status, and audit the product.

Contingency Planning – The development of a management plan that identifies alternative strategies to be used to ensure project success if specified risk events occur.

Contingency Reserve – A separately planned quantity used to allow for future situations may be planned for only in part (sometimes called "known unknowns"). For example, rework is certain, the amount of rework is not. Contingency reserves involve cost, schedule, or both. Contingency reserves are intended to reduce the impact of missing cost or schedule objectives. Contingency reserves are not included in the project's cost and schedule baselines.

Contract – A contract is a mutually binding agreement which obligates the seller to provide the specified product and obligates the buyer to pay for it. Contracts generally fall into one of three broad categories:

> **Fixed price or lump sum contracts** – This category of contract involves a fixed total price for a well-defined product. Fixed price contracts may also include incentives for meeting or exceeding selected project objectives such as schedule targets.
>
> **Cost reimbursable contracts** – This category of contract involves payment (reimbursement) to the contractor for its actual costs. Costs are usually classified as direct costs (costs incurred directly by the project, such as wages for members of the project team) and indirect costs (costs allocated to the project by the performing organization as a cost of doing business, such as salaries for corporate executives). Indirect costs are usually calculated as a percentage of direct costs. Cost reimbursable contracts often include incentives for meeting or exceeding selected project objectives such as schedule targets or total cost.

Appendix A

Project Management Methodology Glossary

Unit price contracts – The contractor is paid a preset amount per unit of service (e.g., $70 per hour for professional services or $1.08 per cubic yard of earth removed) and the total value of the contract is a function of the quantities needed to complete the work.

Contract Administration – Managing the relationship with the seller.

Contract Closeout – Completion and settlement of the contract including resolution of all outstanding items.

Control – The process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

Control Charts – Control charts are a graphic display of the results, over time and against established control limits, of a process. They are used to determine if the process is in control or in need of adjustment.

Control Item – A project element that is considered a unit for the purpose of configuration management. This includes such items as software modules, versions of software systems, project design document, project plans, and other associated documents.

Control System – A mechanism that reacts to the current project status in order to ensure accomplishment of project objectives.

Core Processes – Processes that have clear dependencies and that require the same order on most projects.

Corrective Action – Changes made to bring expected future performance of the project into line with the plan.

Cost Benefit Analysis (CBA) – Provides information to make a balanced decision about the cost and benefits, or value, of various economic choices about various alternatives within the project.

Cost Budgeting – Allocating the cost estimates to individual project components.

Cost Control – Controlling changes to the project budget.

Cost Estimating – Estimating the cost of the resources needed to complete project activities.

Cost of Quality – The costs incurred to ensure quality. The cost of quality includes quality planning, quality control, quality assurance, and rework.

Cost Performance Index (CPI) – The ratio of budgeted costs to actual costs (BCWP/ACWP). CPI is often used to predict the magnitude of a possible cost overrun using the following formula: original cost estimate/CPI = projected cost at completion.

Cost/Schedule Impact Analysis (CSIA) – The process followed to determine the cost and/or schedule impact of a specific change with a project.

Cost Variance (CV) – Any difference between the estimated cost of an activity and the actual cost of that activity.

Crashing – Taking action to decrease the total project duration after analyzing a number alternatives to determine how to get the maximum duration compression for the cost.

Critical Activity – Any activity on a *critical path.* Most commonly determined by using the *critical path method.* Although some activities are "critical" in the dictionary sense without being on the critical path, this meaning is seldom used in the project context.

Project Management Methodology Glossary

Critical Path – The sequence of tasks that determine the minimum schedule for a project. If one task on the critical path is delayed, the schedule will be late.

Critical Path Method (CPM) – A network analysis technique used to predict project duration by analyzing which sequence of activities (which *path)* has the least amount of scheduling flexibility (the least amount of *float).* Early dates are calculated by means of a *forward pass* using a specified start date. Late dates are calculated by means of a *backward pass* starting from a specified completion date (usually the forward pass' calculated project *early finish date).*

Critical Success Factors – Defines how progress and outcomes will be measured on a project—sometimes called "objectives". Some typical critical success factors include technology (specifications, performance, quality), time (due dates, milestones), and cost (total investment, required cash flow, profits).

Current Finish Date – The current estimate of the point in time when an activity will be completed.

Current Start Date – The current estimate of the point in time when an activity will begin.

- D -

Data Date – The point in time that separates actual (historical) data from future (scheduled) data. Also called *as-of date.*

Decision Tree Analysis – The decision tree is a diagram that describes a decision under consideration and shows the implications of choosing one or another of the available alternatives. This analysis incorporates probabilities and the costs of each logical path of events.

Decomposition – The process of breaking down activities and the work package to a manageable level.

Deflection – The act of transferring all or part of a risk to another party, usually by some form of contract.

Deliverable – Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project. Often used more narrowly in reference to an *external deliverable,* which is a deliverable that is subject to approval by the project sponsor or customer.

Design Documents – Technical documents that lay out in great detail the anticipated design of the project deliverable.

Development – The actual work performed to develop the Information Technology Project.

Discrete Activity – A task that has a measurable deliverable and has a definite start and finish. An item on the Work Breakdown Structure would be an example of a discrete activity.

Dummy Activity – An activity of zero duration used to show a *logical relationship* in the *arrow diagramming method.* Dummy activities are used when logical relationships cannot be completely or correctly described with regular activity arrows. Dummies are shown graphically as a dashed line headed by an arrow.

Duration – The number of work periods (not including holidays or other non-working periods) required to complete an activity or other project element. Usually expressed as workdays or workweeks. Sometimes incorrectly equated with elapsed time.

Duration Compression – Shortening the project schedule without reducing the project scope. Duration compression is not always possible and often requires an increase in project cost.

- E -

Early Finish Date – In the *critical path method*, the earliest possible point in time on which the uncompleted portions of an activity (or the project) can be finished based upon the network logic and any schedule constraints. Early finish dates can change as the project progresses and changes are made to the Project Plan.

Early Start Date – In the *critical path method*, the earliest possible point in time in which the uncompleted portions of an activity (or the project) can start, based upon the network logic and any schedule constraints. Early start dates can change as the project progresses and changes are made to the Project Plan.

Earned Value – A method for measuring project performance. It compares the amount of work that was planned with what was actually accomplished to determine if cost and schedule performance is as planned.

Effort – The number of labor units required to complete an activity or other project element. Usually expressed as staff hours, staff days, or staff weeks. Should not be confused with *duration*.

Estimate – An assessment of the likely quantitative result. Usually applied to project costs and durations and should always include some indication of accuracy (e.g., +/- x percent). Usually used with a modifier (e.g., preliminary, conceptual, feasibility). Some application areas have specific modifiers that imply particular accuracy ranges (e.g., order-of-magnitude estimate, budget estimate, and definitive estimate in engineering and construction projects).

Estimate At Completion (EAC) – The expected total cost of an activity, a group of activities, or of the project when the defined scope of work has been completed. Most techniques for forecasting EAC include some adjustment of the original cost estimate based on project performance to date. Also shown as "estimated at completion." Often shown as EAC = Actuals-to-date + ETC.

Estimate To Complete (ETC) – The expected additional cost needed to complete an activity, a group of activities, or the project. Most techniques for forecasting ETC include some adjustment to the original estimate based on project performance to date. Also called "estimated to complete."

Ethics – In the conduct of their operations, state organizations and their employees will employ information technology in a legal and ethical manner consistent with government statutes, rules, and regulations. Information technology will not be used for purposes that are unrelated to the state organization’s mission or violates state or federal law. Contract provisions, including software licensing agreements, will be strictly enforced.

Exception Reporting – The process of documenting those situations where there are significant deviations from the specifications of a project. The assumption is made that the project will be developed within established boundaries. When the process falls outside of those boundaries, a report is made on why this deviation occurred.

Expected Monetary Value – The product of an event's probability of occurrence and the gain or loss that will result. For example, if there is a 50 percent probability that it will rain, and rain will result in a $100 loss, the expected monetary value of the rain event is $50 (.5 x $100).

- F -

Facilitating Processes – Interactions among processes that are more dependent on the nature of the project.

Fast Tracking – Compressing the project schedule by overlapping activities that would normally be done in sequence, such as design and construction. Sometimes confused with *concurrent engineering*.

Feasibility Study – A formal document in the Initiation Phase that analyzes and discusses the technical feasibility of a project.

Project Management Methodology Glossary

<u>Financial Audit</u> – A thorough examination of a project by an evaluation team which includes a detailed overview of the project's financial procedures, budgets, records, etc. It may deal with a project as a whole or the separate individual parts of a project.

<u>Financial Closure</u> – The process of completing and terminating the financial and budgetary aspects of the project being performed. It includes both (external) contract closure and (internal) project account closure.

<u>Float</u> – The amount of time an activity may be delayed from its early start without delaying the project finish date. Float is a mathematical calculation and can change as the project progresses and changes are made to the Project Plan. Also called *slack*, *total float*, and *path float*.

<u>Forward Pass</u> – The calculation of the early start and early finish dates for the uncompleted portions of all network activities.

<u>Free Float</u> – The amount of time an activity can be delayed without delaying the *early start* of any immediately following activities.

<u>Functional Manager</u> – A manager responsible for activities in a specialized department or function (e.g., engineering, manufacturing, marketing).

<u>Functional Organization</u> – An organization structure in which staff are grouped hierarchically by specialty (e.g., production, marketing, engineering, and accounting at the top level; with engineering further divided into mechanical, electrical, and others).

<u>Function Point</u> – Unit of measure to quantify the overall size and complexity of a computer application.

<u>Functional Requirements</u> – What the systems/products are, do, or provide from the customer's point of view.

- G -

<u>Grade</u> – A category or rank used to distinguish items having the same functional use (e.g., "hammer"), but do not share the same requirements for quality (e.g., different hammers may need to withstand different amounts of force).

<u>Graphical Evaluation and Review Technique (GERT)</u> – A network analysis technique that allows for conditional and probabilistic treatment of *logical relationships* (i.e., some activities may not be performed).

<u>Guideline(s)</u> – Used to define a collection of steps that are recommendations to be followed to meet a stated policy(s).

- H -

<u>Hammock</u> – An aggregate or summary activity (a group of related activities is shown as one and reported at a summary level). A hammock may or may not have an internal sequence.

<u>Hanger</u> – An unintended break in a *network path*. Hangers are usually caused by missing *activities* or missing *logical relationships.*

- I -

<u>Impact Statement</u> – A cause and effect report generated at the manager level to show the impact that new projects will have on current schedules and resources as they enter the work stream.

Project Management Methodology Glossary

<u>Implementation</u> – Occurs when products have completed testing are moved into production or into their working environment. Normally used as a term on Information Technology projects.

<u>Independent Project Oversight</u> – A process that employs a variety of quality control, inspection, testing measurement, and other observation processes to ensure that planned project objectives are achieved in accordance with an approved plan. Project oversight is usually done by an independent entity (separate from the project team) trained or experienced in a variety of management and technical review methods. Project oversight includes both technical and management oversight.

<u>Initial Risk Identification</u> – The process during the initial concept phase of identifying risks that might impact a project. The risk identification process is recommended for agencies to evaluate a project.

<u>Initiation</u> – Committing the organization to begin a project phase.

- L -

<u>Lag</u> – The amount of time after one task is started or finished before the next task can be started or finished. For example, in a finish-to-start dependency with a 10-day lag, the successor activity cannot start until 10 days after the predecessor has finished.

<u>Late Finish Date</u> – In the critical *path method*, the latest possible point in time that an activity may be completed without delaying a specified milestone (usually the finish date).

<u>Late Start Date</u> – In the critical *path method,* the latest possible point in time that an activity may begin without delaying a specified milestone (usually the project date).

<u>Lead</u> – The amount of time that precedes the start of work on another task.

<u>Leadership</u> – The way in which the project manager influences the project team to behave in a manner that will facilitate project goal achievement.

<u>Lessons Learned</u> – The learning gained from the process of performing the project, so that other projects can be performed better. Lessons learned can be identified at any point in the project, and should be documented in the Project Notebook.

<u>Level of Effort</u> – Support-type activity (e.g., vendor or customer liaison) that does not readily lend itself to measurement of discrete accomplishment. It is generally characterized by a uniform rate of activity over a specific period of time.

<u>Life Cycle</u> – The type of methodology to be used in project development, e.g. System Development Methodology, Information Engineering Methodology, or Rapid Application Development Methodology.

<u>Life Cycle Costing</u> – The concept of including acquisition, operating, and disposal costs when evaluating various alternatives.

<u>Line Manager</u> – The manager of any group that actually makes a product or performs a service. Often referred to as a *functional manager*.

Project Management Methodology Glossary

Logical Relationship – A dependency between two project activities, or between a project activity and a milestone. See also *precedence relationship.* The four possible types of logical relationships are:

- Finish-to-start: the "from" activity must finish before the "to" activity can start.
- Finish-to-finish: the "from" activity must finish before the "to" activity can finish.
- Start-to-start: the "from" activity must start before the "to" activity can start.
- Start-to-finish: the "from" activity must start before the "to" activity can finish.

- M -

Management Project Oversight – The process of evaluating and monitoring the project management processes that exist for a given project and ensuring that the stated process conforms to the project plan.

Management Reserve – A separately planned quantity used to allow for future situations which are impossible to predict (sometimes called "unknown *unknowns").* Management reserves may involve cost or schedule. Management reserves are intended to reduce the risk of missing cost or schedule objectives. Use of management reserve requires a change to the project's cost baseline.

Master Schedule – A comprehensive list of an approved project containing schedule and progress statistics.

Matrix Organization – Any organizational structure in which the project manager shares responsibility with the functional managers for assigning priorities and for directing the work of individuals assigned to the project.

Methodology – Used to define the processes, policies, and guidelines that are included as part of the framework for project management.

Milestone – A significant event in the project usually completion of a major deliverable.

Milestone Schedule – A summary-level schedule, which identifies the major milestones.

Mission Statement – A concise statement, usually one paragraph, summarizing what the project is about and what it will accomplish.

Mitigation – Taking steps to lessen risk by lowering the probability of a risk event's occurrence or reducing its effect should it occur.

Monitoring – The capture, analysis, and reporting of project performance, usually as compared to plan.

Monte Carlo Analysis – A schedule risk assessment technique that performs a project simulation many times in order to calculate a distribution of likely results.

- N -

Near Critical Activity – An activity that has low total float.

Network Analysis – The process of identifying early and late start and finish dates for the uncompleted portions of project activities. See also *Critical Path Method, Program Evaluation and Review Technique,* and *Graphical Evaluation and Review Technique.*

Node – One of the defining points of a network; a junction point joined to some or all of the other dependency lines. See also *arrow diagramming method* and *precedence diagramming method.*

Project Management Methodology Glossary

- O -

Order of Magnitude – This is an approximate estimate made without detailed data that is usually produced from cost data. This type of estimate is used during the formative stages of an expenditure program for initial evaluation of the project.

Organizational Breakdown Structure (OBS) – A depiction of the project organization arranged so as to relate *work packages* to organizational units.

Organizational Planning – Identifying, documenting, and assigning project roles, responsibilities, and reporting relationships.

Overall Change Control – Coordinating changes across the entire project.

- P -

Parametric Estimating – An estimating technique that uses a statistical relationship between historical data and other variables (e.g., square footage in construction, lines of code in software development) to calculate an estimate.

Pareto Diagram – A histogram that, ordered by frequency of occurrence, shows how many results were generated by each identified cause.

Path – A set of sequentially connected activities in a *project network diagram.*

Path Convergence – In mathematical analysis, the tendency of parallel paths of approximately equal duration to delay the completion of the milestone where they meet.

Percent Complete – An estimate, expressed as a percent, of the amount of work which has been completed on an activity or group of activities.

Performance Reporting – Collecting and disseminating information about project performance to help ensure project progress.

Performing Organization – The enterprise whose employees are most directly involved in doing the work of the project.

PERT Chart – A specific type of *project network diagram.* See *Program Evaluation and Review Technique.*

Plan – An intended future course of action.

Policy – A succinct statement that gives direction to state organizations to support IT implementation. Policies are high-level, overall statements that do not dictate specific procedural steps or processes. Directives issued by management for guidance and direction where uniformity of action is essential.

Post Implementation Evaluation Report (PIER) – Documents the successes and failures of the project. It provides a historical record of the planned and actual budget and schedule. Other selected metrics on the project can also be collected based upon state organization procedures. The report also contains recommendations for other projects of similar size and scope.

Precedence Diagramming Method (PDM) – A network diagramming technique in which activities are represented by boxes (or nodes). Activities are linked by *precedence relationships* to show the sequence in which the activities are to be performed.

Appendix A

Project Management Methodology Glossary

<u>Precedence Relationship</u>– The term used in the *precedence diagramming method for a logical relationship.* In current usage, however, precedence relationship, logical relationship, and dependency are widely used interchangeably regardless of the diagramming method in use.

<u>Predecessor Activity</u> –A task or activity that precedes, or comes before, another task or activity. In the *precedence diagramming method,* the "from" activity.

<u>Priority</u> – The imposed sequences desired with respect to the scheduling of activities within previously imposed constraints.

<u>Procedure</u> – Used to define a collection of steps that the organization is responsible for implementing to ensure that policies and process requirements are met. The agency may use guidelines to develop these procedures.

<u>Product</u> – General terms used to define the end result of a project delivered to a customer.

<u>Product Description Statement</u> – A non-formal, high level document that describes the characteristics of the product/process to be created.

<u>Program</u> – A group of related projects managed in a coordinated way. Programs usually include an element of ongoing activity.

<u>Progress Analysis</u> – The evaluation of progress against the approved schedule and the determination of its impact. For cost, this is the development of performance indices.

<u>Program Evaluation and Review Technique (PERT)</u> – An event-oriented network analysis technique used to estimate project duration when there is a high degree of uncertainty with the individual activity duration estimates. PERT applies the *critical path method* to a weighted average duration estimate.

<u>Project</u> – A temporary endeavor undertaken to create a unique product or service.

<u>Project Administration</u> – Entails making Project Plan modifications that may result from such things as: new estimates of work still to be done, changes in scope/functionality of end-product(s), resource changes and unforeseen circumstances. It also involves monitoring the various Execution Phase activities, monitoring risks, status reporting, and reviewing/authorizing project changes as needed.

<u>Project Charter</u> – A document issued by senior management that provides the project manager with the authority to apply organizational resources to project activities.

<u>Project Communications Management</u> – A subset of project management that includes the processes required to ensure proper collection and dissemination of project infomation. It consists of *communications planning, information distribution, performance reporting,* and *administrative closure.*

<u>Project Concept Document</u> – The document that is the foundation for making a decision to initiate a project. It describes the project purpose and high level planning information to determine project viability.

<u>Project Control</u> – A project management function that involves comparing actual performance with planned performance, and taking corrective action to yield the desired outcome, when significant differences exist.

<u>Project Cost Management</u> – A subset of project management that includes the processes required to ensure that the project is completed within the approved budget. It consists of *resource planning, cost estimating, cost budgeting,* and *cost control.*

Appendix A

Project Management Methodology Glossary

Project Duration – The elapsed time from project start date through to project finish date.

Project Human Resource Management – A subset of project management that includes the processes required to make the most effective use of the people involved with the project. It consists of *organizational planning, staff acquisition,* and *team development.*

Project Initiation – A process that occurs before the organization has begun the Project Planning Phase and denotes a series of steps to have the project externally approved and started, including selection of the project manager.

Project Integration Management – A subset of project management that includes the processes required to ensure that the various elements of the project are properly coordinated. It consists of *Project Plan development, Project Plan execution,* and *overall change control.*

Project Management – The application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements.

Project Manager – The individual appointed and given responsibility for management of the project.

Project Network Diagram – Any schematic display of the logical relationships of project activities. Always drawn from left to right to reflect project chronology. Often incorrectly referred to as a "PERT chart."

Project Oversight – A process that employs a variety of quality control, inspection, testing measurement, and other observation processes to ensure that planned project objectives are achieved in accordance with an approved plan. Project oversight is usually done by an independent entity (separate from the project team) trained or experienced in a variety of management and technical review methods. Project oversight includes both technical and management oversight. (Same as Independent Project Oversight).

Project Phase – A collection of logically-related project activities, usually culminating in the completion of a major *deliverable.*

Project Plan – A formal, approved document used to guide both project execution and project control. The primary uses of the Project Plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.

Project Procurement Management – A subset of project management that includes the processes required to acquire goods and services from outside the performing organization. It consists of *procurement planning, solicitation planning, solicitation, source selection, contract administration,* and *con tract closeout.*

Project Quality Management – A subset of project management that includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of *quality planning, quality assurance,* and *quality control.*

Project Risk Management – A subset of project management that includes the processes concerned with identifying, analyzing, and responding to project risk. It consists of *risk identification, risk quantification, risk response development,* and *risk response control.*

Project Schedule – The planned dates for performing activities and the planned dates for meeting milestones.

Project Scope Management – A subset of project management that includes the processes required to ensure that the project includes all of the work required, and only the work required, to complete the project successfully. It consists of *initiation, scope planning, scope definition, scope verification,* and *scope change control.*

Project Management Methodology Glossary

Project Time Management – A subset of project management that includes the processes required to ensure timely completion of the project. It consists of *activity definition and activity sequencing, activity duration estimating, schedule development,* and *schedule control.*

Project Transition Checklist – A document that ensures that the activities of the Planning Phase have been finished, reviewed, and signed off so that the project may move from the Planning Phase into the Execution Phase.

Projectized Organization – Any organizational structure in which the project manager has full authority to assign priorities and to direct the work of individuals assigned to the project.

- Q -

Quality – A composite of attributes (including performance features and characteristics) of the product, process, or service required to satisfy the need for which the project is undertaken.

Quality Assurance (QA) – The process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.

Quality Control (QC) – The process of monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.

Quality Management – A collection of quality policies, plans, procedures, specifications, and requirements is attained through quality assurance (Managerial) and quality control (Technical).

Quality Planning – Identifying which quality standards are relevant to the project and determining how to satisfy them.

- R -

Remaining Duration – The time, expressed in calendar units, needed to complete an activity.

Requirements Document – A formal document that outlines the high level requirements of a technical project.

Reserve – A provision in the Project Plan to mitigate cost and/or schedule risk. Often used with a modifier (e.g., *management reserve, contingency reserve)* to provide further detail on what types of risk are meant to be mitigated. The specific meaning of the modified term varies by *application area.*

Resource – Something that lies ready for use or that can be drawn upon for aid or to take care of a need.

Resource Leveling – Any form of *network analysis* in which scheduling decisions (start and finish dates) are driven by resource management concerns (e.g., limited resource availability or difficult-to-manage changes in resource levels).

Resource-Limited Schedule – A project schedule whose start and finish dates reflect expected resource availability. The final project schedule should always be resource-limited.

Resource Loading Profiles – Detailed staffing plan including number of personnel by type over time.

Resource Planning – Determining what resources (people, equipment, materials) are needed in what quantities to perform project activities.

Project Management Methodology Glossary

Responsibility Assignment Matrix – A structure which relates the project organization structure to the *work breakdown structure* to help ensure that each element of the project's scope of work is assigned to a responsible individual.

Retainage – A portion of a contract payment that is held until contract completion in order to ensure full performance of the contract terms.

Risk – An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.

Risk Assessment – Review, examination, and judgment of whether or not the identified risks are acceptable. Initial risk assessment is used as a tool to determine project oversight requirements.

Risk Event – A discrete occurrence that may affect the project for better or worse.

Risk Identification – Determining which risk events are likely to affect the project.

Risk Management – The art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interests of its objectives.

Risk Mitigation – The act of revising the project's scope, budget, schedule, or quality in order to reduce uncertainty on the project.

Response Development – Defining enhancement steps for opportunities and mitigation steps for threats.

- S -

Schedule – The planned dates for performing activities and for meeting deliverables.

Schedule Development – Analyzing activity sequences, activity durations, and resource requirements to create the project schedule.

Schedule Performance Index (SPI) – The ratio of work performed to work scheduled.

Schedule Variance (SV) – Any difference between the scheduled completion of an activity and the actual completion of that activity.

Scope – The sum of the products and services to be provided as a project.

Scope Change – Any change to the project scope. A scope change almost always requires an adjustment to the project cost or schedule.

Scope Creep – The gradual addition of new requirements to the original product specifications.

Scope Definition – Decomposing the major deliverables into smaller, more manageable components to provide better control.

Scope Planning – Developing a written scope statement that includes the project justification, the major deliverables, and the project objectives.

Scope Statement – A document capturing the sum of products and services to be provided as a project. The Scope Statement is part of the Project Plan.

Project Management Methodology Glossary

Scope Verification – Ensuring that all identified project deliverables have been completed satisfactorily.

Slack – Term used in *PERT* or arrow diagramming method for *float*.

Specification Documents – Documents that provide specific information about the project deliverable characteristics.

Slippage – The tendency of a project to exceed original estimates of budget and time.

Stakeholder – Individuals and organizations who are involved in or may be affected by project activities.

Statement of Work (SOW) – A narrative description of products or services to be supplied under contract.

State Organization – Used to define a general state organizational level consisting of the Agency and Departments interchangeably. Reference to Agency (with a capital "A") is used for specific reference to an Agency or that specific organizational level.

Status Reports – A report containing information on a specific project, indicating if the project is ahead of schedule, on schedule, or behind schedule in relation to the project plan.

Successor Activity – A task or activity that succeeds, or comes after, another task or activity. In the *precedence diagramming method*, the "to" activity.

- T -

Team Member – The individuals, reporting either part time or full time to the project manager, responsible for some aspect of the project's activities.

Testing – The actual test of the products or processes created within the development phase of an Information Technology project.

Time-Scaled Network Diagram – Any *project network diagram* drawn in such a way that the positioning and length of the activity represents its duration. Essentially, it is a bar chart that includes *network logic*.

- W -

Workaround – A response to a negative risk event. Distinguished from contingency plan in that a workaround is not planned in advance of the occurrence of the risk event.

Work Breakdown Structure (WBS) – A deliverable-oriented grouping of project elements which organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services.

Work Package – A deliverable at the lowest level of the *work breakdown structure*. A work package may be further decomposed into activities.

Appendix B

Project Management Methodology Templates

PM Templates

The Project Management Methodology templates are available in MS Word Document Template format and Rich Text Format at http://www.state.mi.us/cio/opm/

Template Name	File Name
Active Project Transition Document	(PMM22_Active_Project_Transition_Document_01)
Project Feasibility Document	(PMM01_Feasibility_Document_01)
Project Concept Document	(PMM02_Concept_Document_01)
Project Charter	(PMM03_Project_Charter_01)
Project Plan Format	(PMM04_Project_Plan_Document_01)
Project Scope Statement	(PMM05_Scope_Statement_01)
Critical Success Factors	(PMM06_Critical_Success_Factors_01)
Work Breakdown Structure	(PMM07_Work_Breakdown_Structure_01)
Cost Benefit Analysis	(PMM08_Cost_Benefit_Analysis_01)
Resource Plan	(PMM09_Resource_Plan_01)
Risk Management Plan	(PMM10_Risk_Management_Plan_01)
Procurement Plan	(PMM11_Procurement_Plan_01)
Quality Plan	(PMM12_Quality_Plan_01)
Communications Plan	(PMM13_Communications_Plan_01)
Configuration Management Plan	(PMM14_Configuration_Management_Plan_01)
Project Budget Estimate	(PMM15_Project_Budget_Estimate_01)
IT Project Budget Estimate	(PMM16_IT_Project_Budget_Estimate_01)
Project Planning Transition Checklist	(PMM17_Planning_Transition_Checklist_01)
Project Status Report	(PMM18_Project_Status_Report_01)
Change Control Request	(PMM19_Change_Control_Request_01)
Issue Document	(PMM20_Issue_Document_01)
Post Implementation Evaluation Report	(PMM21_Post_Implementation_Eval_Report_01)

Appendix C

Capability Maturity Model

Capability Maturity Model Overview

The Capability Maturity Model (CMM) comes from the Software Engineering Institute (SEI) of Carnegie Mellon University. The SEI has done a lot of research into several areas of business process improvement and reengineering over the past several years, but it is its practice of developing and achieving Software Development Maturity that will be the main focus with respect to this section of the methodology. The CMM, described briefly below, is a professionally recognized model for process development within organizations. The ultimate intent of applying this model as a yardstick for software development is for Michigan State Agencies to achieve a Level 5 maturity in project management, which, if successful, will eventually spread to other methodology areas as well as the entire Michigan State Government.

Capability Maturity Model Defined

The Capability Maturity Model for Software describes the principles and practices underlying software process maturity and is intended to help software organizations improve the maturity of their software processes in terms of an evolutionary path from ad hoc, chaotic processes to mature, disciplined software processes. The CMM is organized into five maturity levels, which are graphically depicted in Figure C.1 and explained below:

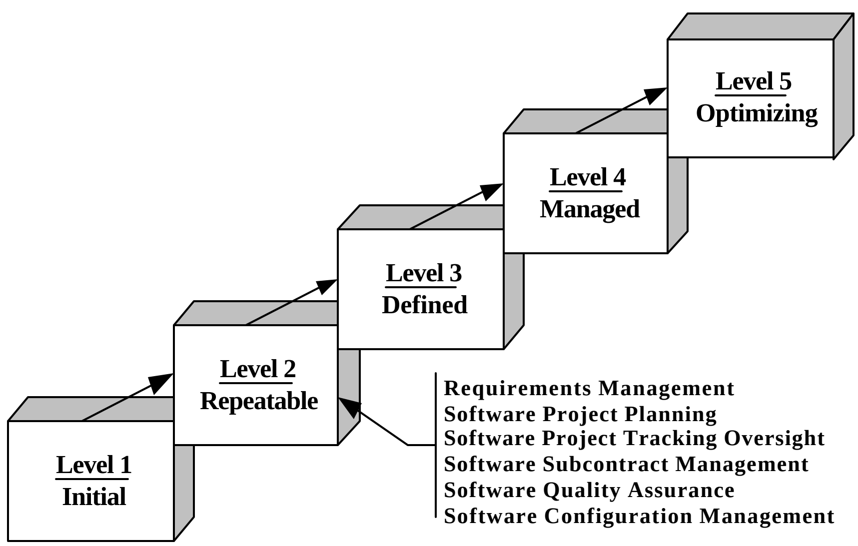

Figure C.1
Capability Maturity Model Process Levels

Capability Maturity Model

Initial
The software process is characterized as ad hoc and occasionally even chaotic. Few processes are defined, and success depends on individual effort and heroics.

Repeatable
Basic project management processes are established to track cost, schedule, and functionality. The necessary process disciplines are in place to repeat earlier successes on projects with similar applications. Key practice areas (processes) are annotated in Figure C.1 for this level of maturity. An in-depth description of these key practice areas can be found at the reference site annotated at the end of this subsection.

Defined
The software process for both management and engineering activities is documented, standardized, and integrated into a standard software process for the organization. All projects use an approved, tailored version of the organization's standard software process for developing and maintaining software.

Managed
Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled.

Optimizing
Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.

Predictability, effectiveness, and control of an organization's software processes are believed to improve as the organization moves up these five levels. While not rigorous, the empirical evidence to date supports this belief.

Capability Maturity Model Process Decomposition

Except for Level 1, each maturity level is decomposed into several key process areas that indicate the areas an organization should focus on to improve its software process.

The key process areas at Level 2 focus on the software project's concerns related to establishing basic project management controls. They are Requirements Management, Software Project Planning, Software Project Tracking and Oversight, Software Subcontract Management, Software Quality Assurance, and Software Configuration Management.

The key process areas at Level 3 address both project and organizational issues, as the organization establishes an infrastructure that institutionalizes effective software engineering and management processes across all projects. They are Organization Process Focus, Organization Process Definition, Training Program, Integrated Software Management, Software Product Engineering, Inter-group Coordination, and Peer Reviews.

The key process areas at Level 4 focus on establishing a quantitative understanding of both the software process and the software work products being built. They are Quantitative Process Management and Software Quality Management.

The key process areas at Level 5 cover the issues that both the organization and the projects must address to implement continual, and measurable software process improvement. They are Defect Prevention, Technology Change Management, and Process Change Management.

Each key process area is described in terms of the key practices that contribute to satisfying its goals. The key practices describe the infrastructure and activities that contribute most to the effective implementation and institutionalization of the key process.

Finding Additional Information

To find out more about the Capability Maturity Model and implementing its methods into your workplace, you can visit SEI's web site at www.sei.cmu.edu/.

Appendix D

Project Management Organizations

Project Management Organizations

International Project Management Association

The International Project Management Association is the recognized international nonprofit network organization for qualified project management. International Project Management Association's vision is to be the prime promoter of project management as a powerful tool for managing change.

International Project Management Association started in 1965 as a discussion group of managers of international projects. The first international congress was held in 1967 in Vienna with participants from 30 different countries. Since that time International Project Management Association has developed steadily and is now the prime international promoter of project management in Europe, Asia, and Arab countries.

A most significant characteristic of the International Project Management Association is the parallel development of 18 associated national societies that serve the specific development needs of each country in its own language. The International Project Management Association has thus emerged as the representative body of an international network of national project management societies.

Pia Svenningsen
International Project Management Association Service Secretariat
DiEU
Dr Neergaards Vej 3
Denmark

Phone: + 45 45 76 46 76
Fax: + 45 45 76 80 20
E-mail: l00113.2403@compuserv.com

Project Management Institute (PMI®)

The Project Management Institute is a nonprofit standards organization located in, and serving primarily, the United States. Project Management Institute publishes the project management standards internationally known as the Project Management Body of Knowledge (PMBOK®).

Project Management Institute
4 Campus Boulevard
Newtown Square, PA 19073-3299 USA

Phone: (610) 356-4600
Fax: (610) 356-4647
E-mail: pmihq@pmi.org

Web Address: www.pmi.org

Center for International Project & Program Management

The Center for International Project & Program Management is an international association and center of advanced communication, research, and learning for professional project managers and those interested in project management. The Center for International Project & Program Management exists to serve, support, and advance project and quality management that serves society, including public and private business, and politics. Founded in 1987, Center for International Project & Program Management is a nonprofit organization located in Ann Arbor, Michigan, at the University of Michigan and subaffiliated with MIT.

Center for International Project & Program Management
123 Charles
Jackson, MI 49203
USA

Association of Project Managers (APM) (UK)

The Association of Project Managers exists to help its members and to advance and promote the profession of project management, its skills, and its practice. It is the only UK-based organization dedicated to advancing the science of project management and the professional development of project managers and project management specialists. The association is committed to an energetic program of activities to help project managers and others involved in project management develop their professional careers. It is affiliated with the International Project Management Association based in Zurich, Switzerland.

Doreen Bevan
Association of Project Managers
85 Oxford Road
High Wycombe Bucks
HP11 2DX

Phone: 01494 440090
Fax: 01494 528937
E-mail: secretariat@apm-uk.demon.co.uk
http://www.asterisk.co /uk/ project/Pmapm.html

Project Management Organizations

Canadian Project Forum (CPF)

The mission of the Canadian Project Forum is to enhance Canadian ability to successfully initiate and execute capital projects in Canada and internationally. The CPF is primarily a knowledge-building association for the fulfillment of members' needs in the most effective manner.

Phone: (403) 228-0885
Fax : (403) 228-3953
E-mail: fosterc&cadvision.com

Performance Management Association of Canada (PMA Canada)

The Performance Management Association of Canada is a professional association dedicated to the discipline of project management in general and performance management specifically. It is the Canadian element of the International Performance Management Association headquartered in Washington, DC, USA. The PMA Canada has three chapters, located in Ottawa, Ontario; Montreal, Quebec; and Toronto, Ontario.

Secretary
Performance Management Association of Canada
PO Box 81031, Ottawa, Ontario
K1P 1B1 Canada

Project Management Institute of Canada

The Project Management Institute of Canada is an organization dedicated to enhancing, consolidating, and channeling Canadian project management knowledge and expertise for the benefit of all stakeholders.

Project Management Institute of Canada
12623 17 Street SW
Calgary, Alberta T2W 4B5

Fax: (403) 281-3068

Appendix E
Books, Publications & Periodicals
Resource & Reference List

Category	Title	Author	Description
PMI® Publications			
	Achieving TQM on Projects: A Journey of Continuous Improvement	Russell W. Darnall	Written in novel form, this book illustrates TQM at work on an award-winning major construction project.
	Conflict Management for Project Managers	Nicki S. Kirchof, John R. Adams	This book reviews the concepts of conflict and conflict management as they apply in the project environment.
	Contract Administration for the Project Manager	M. Dean Martin, C.Claude Teagarden, Charles F. Lambreth	This basic overview of contract management for the project manager provides an orientation to the philosophy of contract management, along with interpretations of some of the legal issues involved.
	A Decade of Project Management: Selected Readings from the *Project Management Quarterly*, 1970 Through 1980	John R. Adams, Nicki S. Kirchof, Eds.	Classic articles covering all aspects of project management.
	Decision Analysis in Projects	John R. Schuyler	The author presents the fundamentals, explains why any decision under uncertainty is best supported with a decision analysis, and covers principal techniques.
	Earned Value Project Management Systems	Quentin W. Fleming, Joel M. Koppelman	This book traces the technique of earned value cost management from its formal introduction as part of PERT/Cost through its most prominent application within the Cost Schedule Control Systems Criteria (C/SCSC) over the past 25 years.
	A Framework for Project and Program Management Integration	R. Max Wideman	Provides a general explanation of project management, some insights into its processes, and suggestions on how to manage projects.
	The Global Status of the Project Management Profession		This is the official report of The Global Project Management Forum, held October 15, 1995, in conjunction with PMI®'s Annual Seminar/Symposium. Representatives from around the world present reports and discuss PM issues of common interest.
	Guide to the Project Management Body of Knowledge (PMBOK®) (2000 Edition)	The PMI® Standards Committee	This document supersedes PMI®'s 1995 PMBOK® document. It is used to provide a consistent structure for PMI® professional development programs, including PMP certification and the accreditation of project management degree programs.

Appendix E

Books, Publications & Periodicals
Resource & Reference List

Category	Title	Author	Description
PMI® Publications			
	Human Resource Skills for the Project Manager *(Volume two of the series, Human Aspects of Project Management)*	Vijay K. Verma	This book draws together information from diverse sources to give the project manager an understanding of communication skills, negotiation strategies, conflict resolution, stress management, leadership, power and influence, and project politics.
	The Implementation of Project Management: The Professional's Handbook	Linn Stuckenbruck, Editor	A valuable resource for both the novice and the experienced project manager. Three case histories discuss the background, types of projects, implementation process, organization, planning, challenges, and problems these organizations faced and resolved.
	Index of PMI® Papers as Published in the *Proceedings of the Annual PMI® Seminars/Symposia* and the *Project Management Journal,* 1969-1984	Linn Stuckenbruck, David Taylor, Editors	Articles from the *Project Management Journal* and papers published in the *Proceedings* of each PMI® Annual Seminar/Symposia from 1969 through 1984.
	Index of Project Management Articles: 1970-1985 (Non-PMI® Literature)	Stephen D. Owens, Francis M. Webster, Amy Y.J. Soong	Encompasses relevant articles appearing in non-PMI® literature from 1970 to 1985.
	Managing the Project Team	Vijay K. Verma	Volume Three of the series, *Human Aspects of Project Management*, this book covers effective team-building, steps to creating self-managed project teams, and inspiring the teams to high performance.
	Negotiating and Contracting for Project Management	Penny Cavendish, M. Dean Martin	This guide reviews some negotiating methods that can help the project manager develop contracts that fit project requirements.
	An Organization Development Approach to Project Management	John R. Adams, C. Richard Bilbro, Timothy C. Stockert	A guidebook to implementing the participative management and facilitating the team-building and horizontal communications so essential to the effective conduct of projects.
	Organizing for Project Management	Dwayne Cable, John R. Adams	Volume One of *Human Aspects of Project Management;* covers project organizational design.
	PMI® Council of Chapter Presidents (CCP) Guide to Preparing for the Project Management Professional Certification Exam (Revised Edition)		This workbook of study materials contains valuable insights that can help potential PMP exam-takers succeed.

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Category	Title	Author	Description
PMI® Publications			
	The Personal Study Program		This PC-based training tool designed to assist with final preparations for the PMP exam immediately scores and grades responses to 340 proprietary questions, permitting students to study at their own pace and convenience.
	Power and Politics in Project Management	Jeffrey K. Pinto	This book covers an overview of the research on power and political behavior; key decision processes; negotiation skills; conflict management; and the management lessons to be learned from the study of power and politics.
	Proceedings of the PMI® Annual Seminar/Symposia		PMI®'s Annual Seminar/Symposia *Proceedings* are a valuable reference source.
	Project and Program Risk Management: A Guide to Managing Project Risks and Opportunities	R. Max Wideman, Editor	Covered are the relationship of risk to uncertainty and opportunity, risk assessment and response methodology, contingency allowances, and an approach to risks in contracts.
	Quality Management for Projects and Programs	Lewis R. Ireland	This book provides a solid discussion of quality variables and the tools, management techniques, methodologies, and costs associated with infusing quality into project management.
	Roles and Responsibilities of the Project Manager	John R. Adams, Bryan W. Campbell	This monograph provides a general explanation of the roles and management functions of the project manager.
	Sample Examination and Study Notebook for Individuals Studying for the Project Management Certification Examination (Revised Edition)	J. Davidson Frame	This study guide is divided into sections, corresponding to the knowledge areas of the *Guide to the Project Management Body of Knowledge*. It provides those who plan to take the PMP certification exam with a good sense of what the exam entails.
	Successful Information Systems Implementation: The Human Side	Jeffrey K. Pinto	The author provides guidelines for achieving success and develops a model of effective project management behavior.
	Team Building for Project Managers	Linn C. Stuckenbruck, David Marshall	This handbook draws from the field of organizational behavior those concepts central to the development of closely knit and cooperative groups and demonstrates their practical application in project management.
	The Project Manager's Work Environment: Coping with time and Stress.	Paul C. Dinsmore, M. Dean Martin, Gary T. Heuttel	This handbook provides a basic overview of time management and stress management.

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Category	Title	Author	Description
PMI® Publications			
	The 1987 PMBOK® Glossary	Max Wideman, Editor	The Glossary contains terms not defined in the Guide to the Project Management Body of Knowledge Glossary published in 1995.

Category	Title	Books Included	Description
PMI® Publications			
Body of Knowledge			
	ECONO Review Package	• Guide to the Project Management Body of Knowledge • Sample Examination and Study Notebook for Individuals Studying for the Project Management Certification Examination • Conflict Management for Project Managers • Contract Administration for the Project Manager • Negotiating and Contracting for Project Management • Organizing for Project Management • Roles and Responsibilities of the Project Manager • Team Building for Project Managers • 1987 PMBOK® Glossary	This package of documents offers the basic material published by the Project Management Institute supplementing the *Guide to the PMBOK®*. See previous listing for description of each individual book.
	FULL Review Package	• The Complete Econo Review Package • A Framework for Project and Program Management Integration • Project and Program Risk Management • Quality Management for Projects and Programs • The Implementation of Project Management • Organizing Projects for Success	This package of documents offers you the full set of material published by the Project Management Institute supplementing the *Guide to the PMBOK®*. These classic PMI® publications offer the depth and breadth you need for a full understanding of the project management body of knowledge. See previous listing for description of each individual book.

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Category	Title	Author	Description
PMI® Periodicals			
	PM Network		The Project Management Institute's monthly magazine for the professional project manager. Designed to keep the reader informed of new developments in the field of project management.
	Project Management Journal		Promotes state-of-the-art knowledge of project management. Also provides a forum for free discussion of project management problems, solution, applications, and opinions. (Back issues available as well as a database search. Call 704/586-3715.)

Category	Title	Author	Description
PMI® Information Source Guide			
Business			
	50 Essential Management Techniques	Michael Ward	This guide encourages readers to create management policies from 50 models. The 50 techniques, including some never before published, are grouped into 11 subject areas, ranging from strategy to learning.
	Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer	Steven L. Goldman, Roger N. Nagel, Kenneth Preiss	This survival guide for today's business environment is the product of extensive research. It focuses on practice rather than theory and includes valuable self-assessment tools for gauging agility.
	Better Change: Best Practices for Transforming Your Organization	The Price Waterhouse Change Integration Team	Step-by-step instructions to help corporate leaders navigate the rough water between a shaky status quo and future success.
	Building Strategic Relationships: How to Extend Your Organization's Reach Through Partnerships, Alliances and Joint Ventures	William Berquist, Juli Betwee, David Meuel	This book shows how successful alliances are launched, developed, and concluded within the corporate world and between corporate entities and government or nonprofit institutions.
	Competitive Global Management: Principles and Strategies	A.F. Alkhafaji	This text discusses the cultural, economic, political, and environmental aspects of conducting business overseas.
	Corporate Misconduct: The Legal, Societal, and Management Issues	Margaret P. Spencer, Ronald R. Simms, Eds.	This book is a resource for students and teachers of business ethics, management, and business-government relations, as well as a practical guide for management on how to counter misconduct.

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Category	Title	Author	Description
PMI® Information Source Guide			
Business			
	Creative Compartments: A Design for Future Organizations	Gerald Fairtlough	The author draws on wide experience and a profound analysis of the operations and interactions of small organizations to set a clear agenda for organizational design.
	Credibility: How Leaders Gain and Lose It, Why People Demand It	James M. Kouzes, Barry Z. Posner	Based on surveys of more than 15, 000 people, 400 case studies, and 40 in-depth interviews, this book shows that leadership is above all a relationship, with credibility as the cornerstone.
	Designing Cross-Functional Business Processes	Bernard Johann	This book offers practical tools, integrating systems theory, economics, and psychology to provide detailed procedures, checklists, data analysis worksheets, and other resources to improve human and organizational performance.
	Designing Organizations: An Executive Briefing on Strategy, Structure, and Process	Jay R. Galbraith	This book provides executives, managers, and consultants with the concrete tools needed to select and implement an efficient design that will create a more competitive organization.
	Transportation Infostructures: The Development of Intelligent Transportation Systems	The Diebold Institute for Public Policy Studies	This volume explores the links between business and government in the development of intelligent transportation systems (ITS) technology. Special attention is given to environmental and economic concerns.

Category	Title	Author	Description
PMI® Information Source Guide			
Project Management			
	5-Phase Project Management	Joseph W. Weiss, Robert K. Wysocki	The best project management practices are compiled in an easy-to-use format to help PMs avoid the common pitfalls caused by communication bottlenecks and conflict over goals and methodologies.
	A Practical Guide to Project Planning	Celia Burton, Norma Michael	A readable book that lets organizations plan projects using the latest techniques. Packed with outlines of quick and easy methods, case histories, diagrams, and charts.

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Category	Title	Author	Description
PMI® Information Source Guide			
Project Management			
	Best Practice Benchmarking	Sylvia Codling	This book shares the experience and knowledge acquired by benchmarking companies across a wide range of industries. It provides a step-by-step guide to the entire process, including a complete set of planning worksheets.
	Dynamic Project Management	D.S. Kezsbom, et al.	This guide examines high-tech engineering projects and shows how to manage them in today's high-tech project environment.
	Fundamentals of Project Management	James P. Lewis	Culled from the best practices of experts in the field, this concise new W*orksmart* book explains how to juggle multiple tasks on a complex project from start to finish.
	Getting a Project Done on Time: Managing People, Time and Results	Paul B. Williams	This concise, reality-based guide is filled with self-assessment tools, checklists, tips, and step-by-step instructions on how to manage a project.
	Global Project Management Handbook	David I. Cleland, Ronald Gareis	Written by 48 leading experts from 19 countries around the world, this handbook explores project management as an organizational strategy.
	Handbook of Project-Based Management	Rodney Turner	This handbook offers a simple but effective tool kit of creative management skills.
	How to Plan Any Project: A Guide for Teams (and Individuals), (Second Edition)	Thomas C. Belanger	This revised edition is a planning tool for small projects, a companion to project management software, and a companion to project management textbooks.
	Managing Projects in Organizations, Revised Edition: How to Make the Best Use of Time, Techniques, and People, (Second Edition)	J. Davidson Frame	This new edition of what has been called "the thinking manager'' guide to project management is introductory without being low-level. Unlike many other project management texts, this text also covers service industries and product development.
	Planning Techniques: Basic and Advanced	Robert M. Kelley	A practical how-to book that covers, step-by-step and part-by-part, the people skills required to make any project management system work.

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Category	Title	Author	Description
PMI® Information Source Guide			
Project Management			
	Project Management Basics: A Step by Step Approach	R.L. Kimmons	Details techniques to monitor a system from the planning stage to the actual execution and quality control of work, emphasizing the sequential nature of the project management process.
	Project Management Demystified: Today's Tools and Techniques	Geoff Reiss	This book approaches project management with a no-nonsense and sometimes humorous tone.
	Project Management for the 21st Century	Bennet P. Lientz, Kathryn P. Ross	This text discusses how to employ technology effectively, covers organizational and behavioral aspects of project management, provides advice for dealing with 100 common problems, and serves as a practical guide to setting up and managing people.
	Project Management in Manufacturing and High Technology Operations	Adedeji Bodunde Badiru	This book presents techniques for managing technical personnel and includes PERT and CPM. It features a new approach to project management designed to meet the demands of an era or rapidly changing and competitive high technology.
	Project Management with CPM, PERT and Precedence Diagramming (Third Edition)	J.J. Moder, C.R. Phillips, E.W. Davis	A reprint of the third edition of this popular textbook. This book deals with network planning, time schedules, cost and resource management, and computer applications.
	Project Management (Fifth Edition)	Dennis Lock	A comprehensive, up-to-date guide to the full range of skills that are necessary to succeed in the field of project management.
	Project Management: A Managerial Approach, (Third Edition)	J.R. Meredith, S.J. Mantel, Jr.	This updated edition contains new applied examples and case studies, new coverage of top project management software, expanded material on the information systems development cycle, and new direction on career opportunities.
	Project Management: A Systems Approach to Planning, Scheduling, and Controlling (Fifth Edition)	Harold Kerzner	This revised edition of Kerzner's classic reference on project management updates project management theory and techniques within the context of today's changing marketplace.

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Category	Title	Author	Description
PMI® Information Source Guide			
Project Management			
	Project Management: How to Plan and Manage a Successful Project	Joan Knutson, Ira Bitz	The authors lay out each step of how to plan, implement, and finish up a project, supplying the techniques that business people new to project management need.
	Project Management: Planning and Control (Second Edition)	Rory Burke	Using many practical examples and exercises, the author provides a guide for the manager who wants to build a successful career in project management.
	Project Management: Strategic Design and Implementation (Second Edition)	David I. Cleland	A state-of-the-art guide to the theory and practice of project management, this book shows managers and planners how to use the management of projects as key building blocks in the design and execution of organizational strategies.
	Project Manager's Desk Reference	James P. Lewis	This reference guide integrates management theory with practice for projects of all scales.
	Project Planning and Management: An Integrated System for Improving Productivity	Louis Goodman	This text describes the Integrated Project Planning and Management Cycle (IPPMC) and provides case studies and lessons learned from such projects as the Hawaii geothermal project and the Trans-Alaska pipeline system.
	Project Planning, Scheduling & Control (Revised Edition)	James P. Lewis	Presents the essential tools and techniques of project management with real-world examples and humorous anecdotes.
	Project Planning, Scheduling and Control in Construction: An Encyclopedia of Terms and Applications	Calin Popescu	An essential tool for everyone involved in project management, this quick reference brings coverage of all project management concepts and terms.
	Successful Project Managers: Leading Your Team to Success	Jeffrey K. Pinto, O.P. Kharbanda	This book shows you step-by-step how to develop leadership skills that will make your team shine and help you complete projects on time and within budget.
	The AMA Handbook of Project Management	Paul C. Dinsmore	Presents critical concepts common to all projects, as well as in-depth solutions for specific areas such as change management, R&D, and international projects.

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Category	Title	Author	Description
PMI® Information Source Guide			
Project Management			
	The Management of Projects	Peter W.G. Morris	The author provides a history of the events in the growth of the discipline, a detailed picture of how it is practiced in different industries /cultures, a model of best practice, and a vision of how project management will evolve over the next ten years.
	The New Project Management: Tools for an Age of Rapid Change, Corporate Reengineering, and Other Business Realities	J. Davidson Frame	Examines the new realities of project management: managing risk, maintaining quality of goods and services, outsourcing, satisfying customers, and communicating effectively with managers, customers, vendors, and staff.
	The Noah Project	Ralph L. Kliem	In this “novelization” of project management, the characters and events are fictitious, but the tools, techniques, and circumstances mirror reality for just about any project in any environment. Entertaining!
	The Project Manager’s Tool kit	Duncan-Nevison	Subscription newsletter published four times per year. Checklists, book reviews, tips, and techniques.

Category	Title	Author	Description
PMI® Information Source Guide			
Procurement			
	Privatized Infrastructure: The BOT Approach	C. Walker, A. Smith	This book explains how, where, and why the Build-Own/Operate-Transfer concept evolved and highlights the possible pitfalls as well as the potential windfalls. The book presents a new perspective on old problems.

Category	Title	Author	Description
PMI® Information Source Guide			
Product Development			

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Books, Publications & Periodicals
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Category	Title	Author	Description
PMI® Information Source Guide			
Product Development			
	Global Interface Design	Tony Fernandes	This book addresses issues involved in product development for a global market with a real-world focus. It covers areas developers should address during the development cycle and provides insights into researching cultural differences.
	Managing Software Development Projects (Second Edition)	Neal Whitten	The author focuses on the most common, big-ticket problems that plague software development projects—and offers solutions.
	World-Class New product Development	Dan Dimancescu, Kemp Dwenger	This book shows executives and managers how to duplicate a style of management that merges total quality, concurrent engineering, and process reengineering practices.

Category	Title	Author	Description
PMI® Information Source Guide			
Quality			
	5 Pillars of the Visual Workplace: The Sourcebook for 5S Implementation	Hiroyuki Hirano	The 5S's (seiri, seiton, seiro, seiketsu, and shituske—or organization, orderliness, cleanliness, standardized cleanup, and discipline) provide the basis for a theory that fosters efficiency and continuous improvement.
	Back on the Quality Track: How Organizations Derailed and Recovered	Kathryn Huddleston	Quality is alive and well and working in America: the author shares insider stories of champions of quality, along with those of companies that got off the track.
	Customer-Driven Project Management: A New Paradigm in Total Quality Management	Bruce T. Barkley, James H. Saylor	This book offers project managers, team members, and organizational leaders a new tool for continually assessing the customer's quality improvement needs and delivering superior products and services.
	Focused Quality: Managing for Results	Paul Murphy, Harvey Brelin, Lyell P. Jennings, Kim Davenport	This book focuses on using quality improvement as a means to enhanced bottom-line results. Written for managers, this book provides an approach on how to target improvement initiatives and ensure their success.

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Category	Title	Author	Description
PMI® Information Source Guide			
Quality			
	Gower Handbook of Quality Management (Second Edition)	Dennis Lock	The handbook describes the appropriate methods, practices, and procedures needed to stay on top of the competition
	Integrating Productivity and Quality Management (Second Edition)	Johnson Amie Edosomwan	This updated edition details all productivity and quality methodologies, principles, and techniques and demonstrates how they interact in the three phases of the productivity and quality management triangle. Focuses on customer satisfaction.
	ISO 9000: An Implementation Guide for Small to Mid-Sized Businesses	Frank Voehl	This book shows sample procedures that can easily be adapted for in-house use; presents a cost-effective blueprint for doing the work, including a detailed rollout plan for implementation; and contains many examples, case studies, and illustrations.
	It's About Time: A Fable About the Next Dimension of Quality	John Guaspari	This unique, witty business fable provides an eye-opening presentation of the basics of time-based competition. It helps organizations see what must be done to get beyond the first steps in delivering quality in customer terms.
	Leadership and the Customer Revolution: The Messy, Unpredictable, and Inescapably Human Challenge of Making the Rhetoric of Change a Reality	Gary Heil, Tom Parker, Rick Tate	This book looks at today's rhetoric about change and at the reality. The authors lay out 20 challenges that must be confronted.
	Management Master Series, Set 2: Total Quality	William F. Christopher	The six books in Set 2 examine meaningful aspects of Total Quality. They introduce managers to fundamental shifts happening in their jobs, the changing role of their employees, and the tools they need to accomplish their goals.
	Operations Management	Lee Krajewski	Solutions to operations problems make a significant difference in the competitiveness of a firm. This volume presents approaches to these problems.
	Quality by Experimental Design (Second Edition, Revised and Expanded)	Thomas B. Barker	The author integrates Taguchi's design methodology as a natural part of the design effort and presents the mathematical aspects of statistical experimental design in an intuitive rather than a theoretical manner.

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Category	Title	Author	Description
PMI® Information Source Guide			
Quality			
	Quality Planning, Control, and Improvement in Research Development	George W. Roberts, Editor	An in-depth study of the strengths and weaknesses of peer review highlights needed changes in current lab-management practices.
	Randall's Practical Guide to ISO 9000	Richard C. Randall	Randall offers well-organized and easy-to-use coverage of how to understand, register for, and implement the new ISO 9000 Standard for certification.
	The ISO 9000 Book (Second Edition)	John T. Rabbitt, Peter A. Bergh	Newly revised to reflect the latest changes to the standards, this guide covers ISO 9000 certification from the preparation to the final audit.
	The Quality Improvement Handbook: Team Guide to Tools and Techniques	Roger Swanson	This reference for quality teams introduces an eight-tep quality improvement model and also incorporates information on the 7 quality tools, 7 management tools, and an additional 20 tools and techniques that are less frequently used.
	The Quality Yearbook, 1996 Edition	James W. Cortada, John A. Woods	The annual guide to every significant idea, practice, and event in the world of quality.
	Total Quality Management: Text, Cases and Readings, (Second Edition)	Joel E. Ross	Used in more than 200 colleges and universities around the country, this text, now revised and expanded, enhances the original seven chapters in the first edition with additional material, new case studies, and valuable new readings.
	Total Quality Service	D.H. Stamatis	This book demonstrates how companies can provide the quality customer service that is so crucial to success.
	Total Quality Through Project Management	Jeffrey S. Leavitt, Philip C. Nunn	Leads project management and quality professionals step-by-step through each phase of the process—from original concept through development, and from implementation through the termination and maintenance of a quality improvement project.

Category	Title	Author	Description
PMI® Information Source Guide			
Risk			

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Category	Title	Author	Description
PMI® Information Source Guide			
Risk			
	Risk Analysis in Project Management	J. Rafferty	Providing rules of thumb for risk analysis and management, this text includes an introduction to risk analysis and management, software reviews, and case studies.
	Risk Management for Software Projects	Alex Down, Michael Coleman, and Peter Absolan	In this volume, three respected IBM specialists cover the principles of practical risk management and the major techniques, both qualitative and quantitative.
	What Every Engineer Should Know About Reliability and Risk Analysis	M. Modarres	Important reliability aspects of both components and complex systems are covered in this reference. Reliability, availability, and risk analysis are discussed.

Category	Title	Author	Description
PMI® Information Source Guide			
Sales/Marketing			
	Marketing Non-profit Organizations (Second Edition)	David L. Rados	A professional text for anyone interested in marketing in the nonprofit sector. It covers the entire field, from explaining what marketing is to describing the role of marketing in the nonprofit organizations.
	Online Marketing Handbook: How to Sell, Advertise, Publicize, and Promote Your Products and Services on the Internet and Commercial Online Services	Daniel S. Janal	From strategies for using this new medium effectively to the social and legal issues involved, the author offers; up-to-date information on the Internet, as well as other major on-line systems.
	The New Corporate Activism: Harnessing the Power of Grassroots Tactics for Your Organization	Edward A Grefe, Martin Linsky	The authors demonstrate how organizations can influence the public issues that affect them and present a blueprint for getting the message out.
	Total Quality in Marketing	William C. Johnson, Richard J. Chvala	This tool for managers helps them apply total quality principles to the overall management of the marketing function.

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Category	Title	Author	Description
PMI® Information Source Guide			
Time			
	Analysis Bar Charting	John Mulvaney	A simplified approach to the critical path method using the new and improved precedence diagramming method (activity on node). An excellent textbook for training programs.
	Precedence Networks for Project Planning and Control	P.J. Burman	A reprint of a classic work on the use of precedence networks to plan projects of all kinds and sizes. The book explains fundamental concepts of project management in simple terms.

Appendix F
Project Management Methodology Review Process

The Project Management Methodology Review Process

This Project Management Methodology is a useful tool, but it can only improve through input from the users of the methodology itself. If a project manager discovers areas in which the methodology falls short or pertinent management areas that have been omitted, it is the responsibility of that individual to suggest a document revision. If changes or additions need to be made, the project manager should contact his or her agency representative to the Methodology Assessment Group (MAG) and discuss it with him or her. After being reviewed, the revisions will then be incorporated in the next release of the methodology.

Therefore, this methodology will be updated on a regular basis as requested by the State's Project Management MAG. The group will meet on a quarterly basis to discuss content changes. The timeline for the revision process is depicted below.

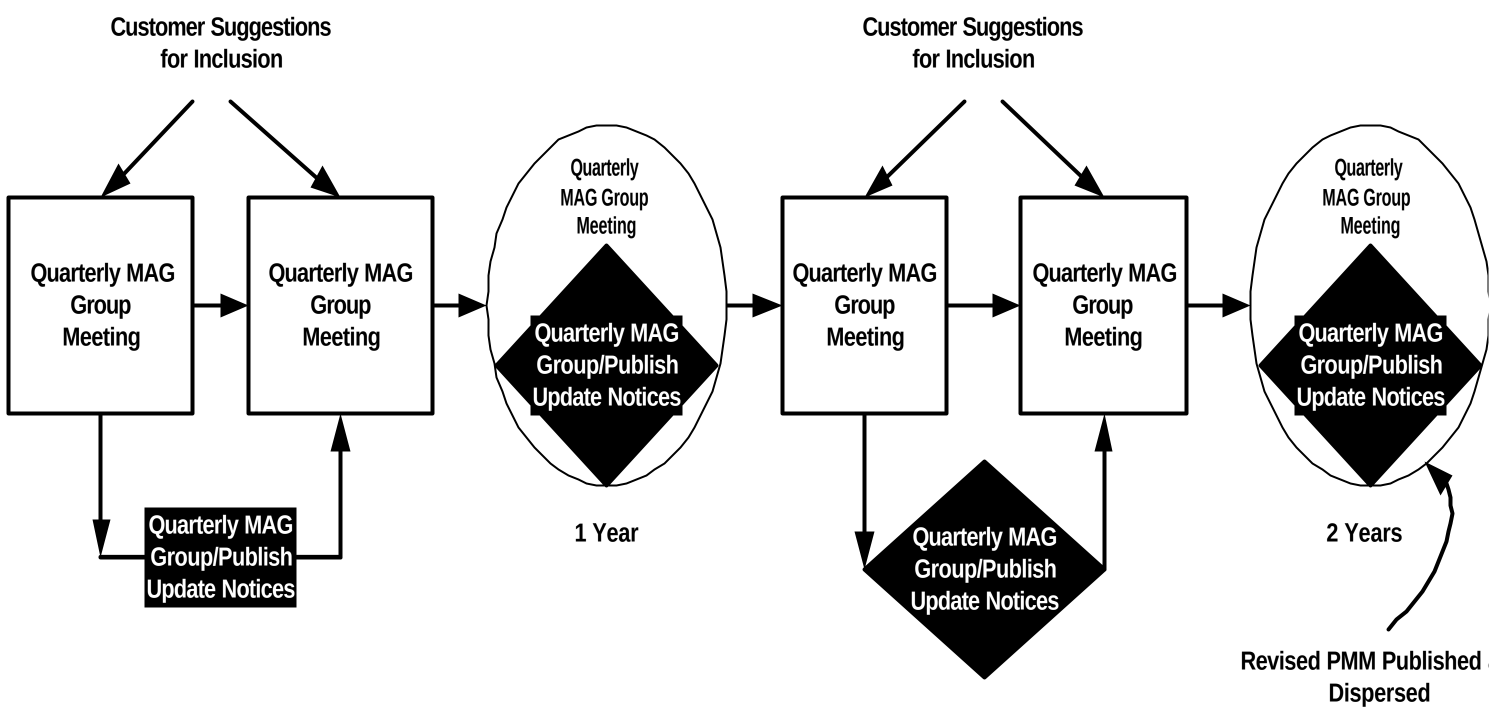

Figure F.1
Project Management Methodology Assessment Timeline

As can be seen from the diagram above, any suggestions made by the customer (project manager) will be discussed at quarterly review meetings. Suggestions determined to be beneficial will be reviewed on an annual basis to determine updates as needed. As a minimum, the Project Management Methodology will be updated on a two-year review cycle.